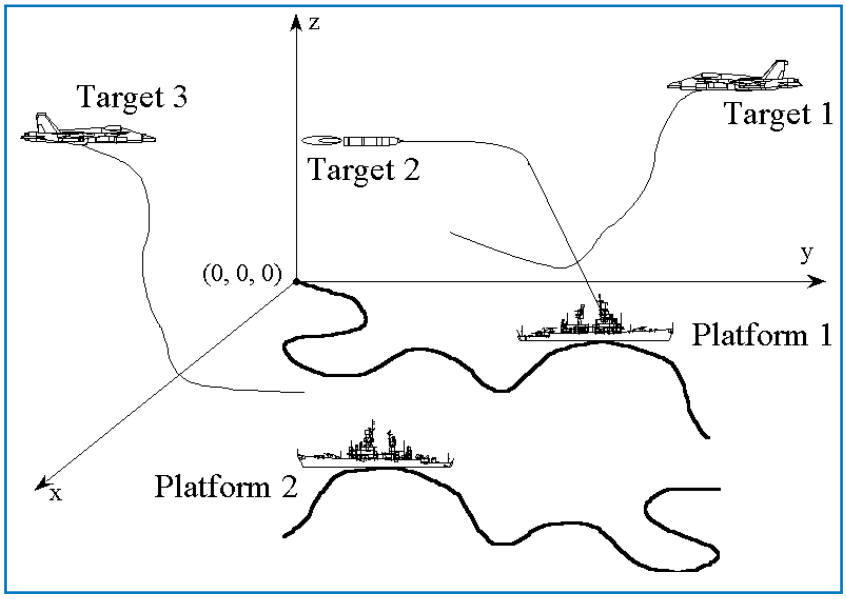
Testbed for Maritime data fusion

- **Investigates maritime data fusion devices and techniques.**
- **Includes environmental conditions.**
- **Modular approach facilitates changes to devices, algorithms, methods and criteria.**

Multiple Target Information Must Be Dealt With

The maritime warfare environment is complex. Potentially hostile ships and aircraft—possibly armed with weapons that can be lethal even when launched at long range—slip into and out of the coverage of a variety of sensing systems, while the physical environment changes constantly. The very survival of a ship —and the success of operation in which it is engaged— depends upon the sensors it carries and how effectively it uses them.

The characteristics of sensor systems vary considerably, and the best choice for a given situation may be the worst for another. Radar and infrared systems respond differently to different potential target types, provide different levels of information about them, and are limited in different ways by environmental conditions. Tactical considerations often favour the use of passive detection methods, rather than active. And the presence of allied elements in the neighborhood can greatly affect the optimum way to cover the area of interest effectively. How cooperating ships or aircraft can best choose and use sensors and how the resulting information can be fused into the best possible target track information is a high priority for modern navies.



Several cooperating warships using a variety of sensing systems (radar, visual, infrared…) must determine the threats represented by each of many potentially hostile targets, usually very quickly, by deriving track information for each.

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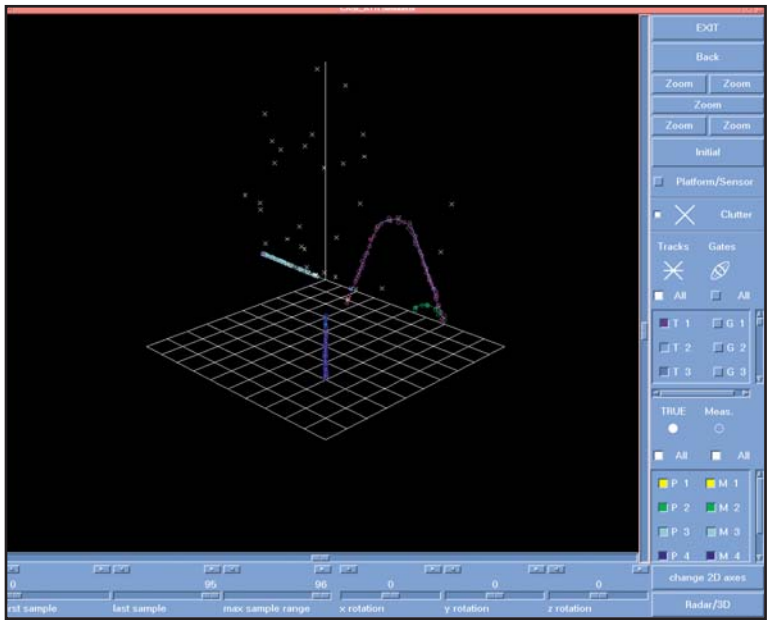
An Adaptable Simulator

DRDC Valcartier has provided help by developing a modular, flexible simulation environment, the Concept Analysis and Simulation Environment for Automatic Target Tracking and Identification (CASE ATTI). This testbed provides a detailed simulation of maritime conditions, with particular emphasis on environmental factors that affect the performance of sensors of all kinds, user-defined engagement scenarios that may include multiple platforms (surface, under-water and airborne, both stationary and moving, friendly or hostile), sensor systems and tracking and fusion algorithms.

Major components are modeled with "plug-in" object-oriented software modules whose characteristics can readily be modified to investigate changes to hardware or tactics. User- friendly interfaces are provided for all major functions: setting up the scenarios to be simulated, specifying the sensor types and capabilities (from generic to very detailed), describing the way track data from various platforms or individual sensors will be fused, and interpreting results.

The testbed's primary application is the investigation of multisensor data fusion algorithms: how to combine fragmentary target information from several sensors, which may not be co-located and whose characteristics and reliability may differ significantly, to give the best possible estimate of a potential target's course and intent. The modularity of the simulation provides a great deal of flexibility to aid such studies: systems can be modeled that include components varying from those in which track information is provided by the primary sensor itself all the way to those in which data from different sensors on different platforms is combined at a global fusion site. Low-level sensors may be guided by feeding them on-going track results from high-level fusion processes. Even externally generated sensor data, real or simulated, can be accommodated.

The object-oriented approach used in the testbed allows software "inheritance" to be applied to speed the simulation of new classes of sensor or to investigate the effect of improvements to existing sensor or tracking systems: only the changed characteristics of the new simulation module must be programmed; its generic properties—and its interconnections with the rest of the simulation—are acquired automatically.



A typical output screen showing fused tracking information from a particular scenario. The tracks of two sea-skimming missiles are visible, as is the fused track of a "pop-up" missile. The other cross symbols in the scene are false alarms.

For more information

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