QinetiQ North America, along with its teammate Applied Research Laboratory at Pennsylvania State University (PSU-ARL), has developed the Hull Crawler, an unmanned underwater vehicle (UUV) with an imaging sensor payload, crawler and operator control unit that performs EOD hull inspections.

Hull Crawler removes the immediate danger associated with EOD diver inspections. It provides operators with high-quality sonar imagery (tagged with appropriate target localization information) coupled with up-close video to minimize false detections.

Hull Crawler is a two-vehicle system deployed to survey an underwater structure; determine the presence of an object of interest (OOI); transmit the image for operator evaluation; mark the position for further evaluation; and return to the object for detailed visual assessment and potential neutralization.

The Swimmer Carrier Vehicle (SCV) is ideal for harbor incursion. Its dual thrusters allow it to turn within its hydrodynamic center so that it is highly maneuverable in tight spaces. In addition to housing the inspection sonar, the SCV carries the small, crawling robot for deploying near OOI’s for up-close visual inspections as needed.

The small crawling robot can be deployed from the SCV, placed from the ships deck or manually placed onto the hull. Crawling with fixed permanent magnets, it provides a unique underwater inspection tool to augment the capabilities of the sonar imaging system on the SCV and provides unique access to areas unreachable by any swimming robot.

CONOPS depicting an EOD technician operating the OCU unit remotely from a rigid-hulled inflatable boat. Illustration also shows the SCV performing a hull sweep independently of its deployed crawler robot. This saves time while still allowing up-close inspections of identified OOI’s when needed.
Hull Crawler side-sonar image collected and stitched in real-time for a 530 ft long vessel, with automatically identified OOI’s marked for further investigation. Complete scan took approximately 25 minutes to complete. Side-sonar (with a resolution of ~ 1 cm/pixel), provides adequate image quality to detect and classify OOI’s on the vessel hull; deployment of the crawler provides classification and identification of OOI’s.

Crawler Specifications
• Weight: ~13 lbs
• Dimensions: 10” L x 7” W x 3.5” H
• Range, Depth: Continuous (120 VAC or battery available), 200 feet
• Vehicle Control: Autonomous or semi-autonomous manual
• Obstacle Avoidance: Detects cliffs and walls
• Imaging: Video camera
• Maximum Speed: ~ 3 meters/minute
• Programmability: Non-contact IR communications
• Towing Capacity: Up to 50 lbs vertically

SCV Specifications
• Weight: ~130 lbs
• Dimensions: 36” L x 18” W x 8” H
• Range, Depth: 4 nautical miles on a single charge, 200 feet
• Vehicle Control: Autonomous or semi-autonomous manual
• Obstacle Avoidance: Profiling sonar for hull detection and stand-off
• Imaging: Side scan sonar
• Longitudinal Resolution: ~1 cm/pixel
• Maximum Speed: ~ 4 knots
• Hull Imaging Rate: ~ 200 m²/minute