



# CASE STUDY

## Distributed simulation using HLA and DIS

### NSRS (NATO Submarine Rescue System) Simulation

The NSRS simulation models the surface recovery of a NATO submarine rescue vessel onto a mother ship fitted with a portable launch and recovery system. An important feature of the new system is the possibility of undertaking recovery at high sea states without the need for divers to enter the water. The simulation capability allows risks to be assessed and will support the acceptance of the real system. It can also be used to predict the performance of candidate mother ships that may be called to a rescue situation in the future.

### Ship/Air Interface Framework

The primary objective of the SAIF architecture is to provide a world-class simulation capability for conducting ship helicopter operating limit (SHOL) assessments. It is envisaged that a cost effective combination of simulation and first-of-class flight trials at sea will maximise the operating envelope of helicopters from new ship platforms. SEA has developed a federated version of the Merlin helicopter flight simulator at RNAS Culdrose. Successful validation trials have taken place, leading to the production of an indicative SHOL for the new Type 45 destroyer. The federated approach allows ship and ship air wake models to be easily interchanged, and the architecture can also be applied to other flight simulators, for example to assess future-Lynx operations. Since the SAIF architecture is independent of any particular ship or aircraft type, it may also be used to assess the operational performance of fixed or rotary wing Maritime Unmanned Aerial Vehicle (MUAV) concepts in the key launch and recovery phases.

### Replenishment at Sea (RAS) Simulation Capability

The RAS Simulation Capability simulates the transfer of heavy loads between any chosen supply and receiving ship, and can be used to compare the behaviour of various transfer rig designs. Developed by SEA, the system simulates the response of the ships to forces arising from propulsion, steering, the transfer system and hydrodynamic interaction. The response of the load due to load-sea interaction is also modelled.

### S29 Submarine Simulation

The S29 submarine simulation environment can be used to study the behaviour of underwater vehicles. The distributed simulation solves problems that cannot easily be solved by a single piece of monolithic code, for example the interaction of multiple underwater bodies, ships and cables. Scenarios of particular interest include a small underwater body navigating in the vicinity of a moving submarine, and a rescue vessel navigating and mating with the escape hatch of a distressed submarine.

### Use of Synthetic Environments to Support Human Factors Integration

As part of the HFI DTC, SEA carried out human performance trials using a federated Synthetic Environment (SE). SEA's brief was to provide an extensible urban SE, using open standards that enable cognitive human factors issues to be explored and measured. Participants were asked to take the role of a dismounted soldier on patrol in an urban environment. Subjective and primary measures of performance were taken while teams of participants carried out the mission. An administrator interface allowed HF experimental administrators to set the timing and content of subjective workload and situational awareness questionnaires off and on line. In addition, administrators were able to specify primary measures of performance. The design of the administrator tool and data-logging manager enabled users to input new measurement instruments, and the architecture enabled these HFI components to be incorporated within an HLA federation.