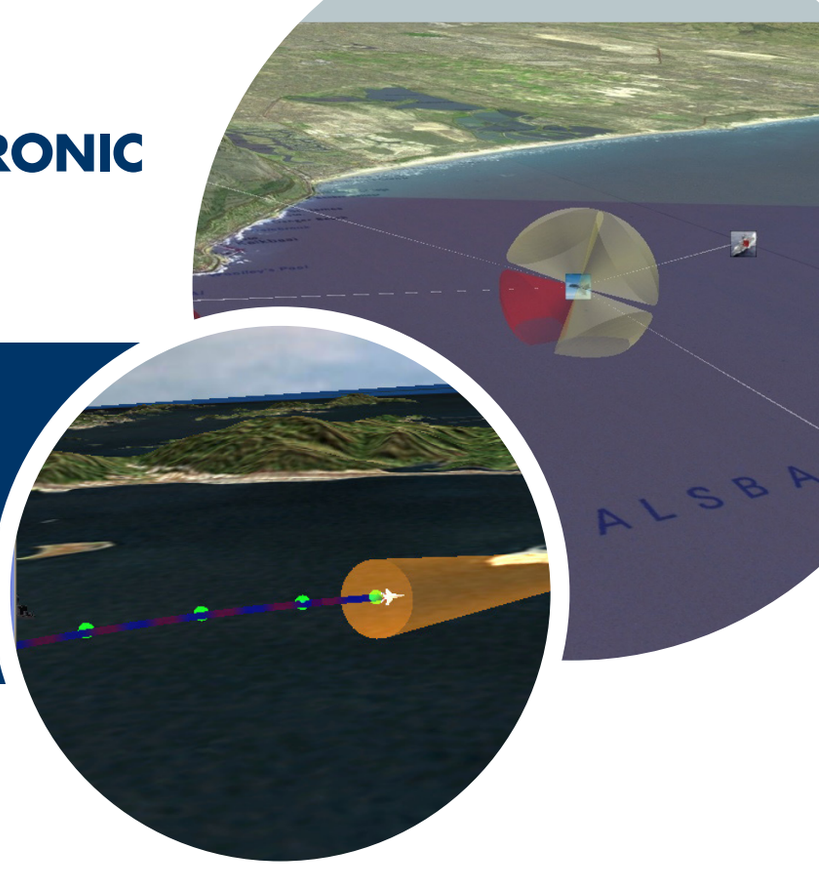
CSIR SENSORS AND ELECTRONIC WARFARE ENGAGEMENT SIMULATION



The CSIR Sensors and Electronic Warfare Engagement Simulation (SEWES) is a few-on-few electronic warfare (EW) simulation environment. Any number of platforms, consisting of any number of sensors and EW systems, can engage each other in a simulated environment.

SEWES is used by defence research institutes, EW centres and defence contractors for EW research and development, system development and optimisation, EW effectiveness evaluation, doctrine development, planning, debriefing and training.

Decision-makers can simulate "what if" questions using SEWES to develop and evaluate doctrines. Using MATLAB®, a programming and numeric computing platform, and Simulink®, a MATLAB-based graphical programming environment for modelling, simulating and analysing multidomain dynamical systems, gives a great advantage in terms of rapid prototyping, readability and full understanding of implemented models. The parameter level simulation of the systems and interactions is modelled to a detailed level. All relevant system parameters in the simulation can be displayed and stored, while the engagement scenario is visualised in three dimensions. Visual configuration and management of the simulation enable quick and easy operation. Generated outputs are export-ready and user-friendly for other applications, as well as display and visualisation.

Continued product development of more than 15 years has led to a mature offering, which has contributed to capability establishment at multiple international users. SEWES is also recognised by MathWorks®, a private company that specialises in mathematical computing software, as a third-party product.

The SEWES can be used to:

- Perform complex scenario analysis in a controlled, cost-effective and predictable manner;
- Predict own and enemy system performance and validate against controlled and field tests;
- Harden own systems and expose vulnerabilities of enemy systems;
- Plan complex test and evaluation exercises;
- Brief operators before executing tests; and
- Train personnel in the complex field of radar and electronic warfare.

SEWES provides a comprehensive modelling and simulation capability for:

- Algorithm level analysis of scenario results
  - Why did the tracking radar not detect a low-flying target at the expected range?
- System mode analysis
  - Why did the missile not break lock, given the current jamming technique?
- Effect of the natural environment on a scenario outcome

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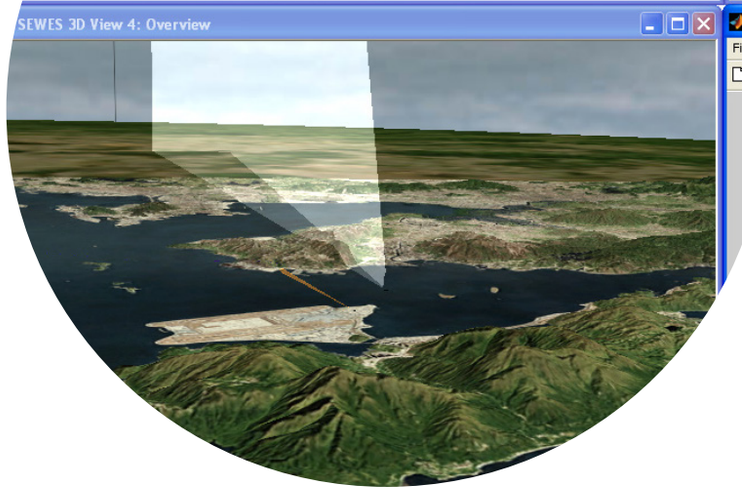

- How did the terrain influence the effectiveness of the jamming technique?

- Sub-system interaction investigation
  - Does the handover from the search radar signal processor to the data processor create vulnerabilities to jamming?
- Doctrine evaluation
  - Will the chaff successfully protect the platform against multiple incoming missiles?

Features:

- The software can provide static and dynamic simulation capabilities.
  - Static: System performance can be predicted for a stationary setup and a specific point in time.
  - Dynamic: The models in the simulation change their behaviour and interaction as a function of simulation time.
- All source code for the models and the simulation architecture is provided.
- The simulation architecture is scalable, distributed and parallel.
  - Scalable: There is no limit to the number of platforms or systems in the simulation.
  - Distributed: The simulation can run on a single or multiple computers.
  - Parallel: The various models run in time synchronisation, in parallel, on various computers.
- A library of models can be created and used in simulation. There is no limit placed on the size of the library.
- A model parameter library. This is used to manage and store system-specific parameter values to be used in simulation.
- Simulation batch runner. Multiple simulations can be set up to vary parameters over a range of values without human intervention.
- Automatic generation of simulation engines can be generated for the CSIR's Dynamic Scenario Planner (DSP) allowing for models of systems created for the EW range in SEWES to be used in the DSP.
- Pulse descriptor words from SEWES can be used as inputs to a CSIR software signal generator to allow for the realisation of high-fidelity time domain signals.
- The network centric reactive architecture enables the analysis of complex system and platform interactions encountered in the modern battlefield.

User designs specific scenarios, models and simulations

The innovative architecture enables the owner to easily modify the simulation to specific requirements and to interoperate with other simulations. It allows for a fully scalable distributed simulation in terms of the number of platforms in the simulation, the number of systems that can be added to the various platforms and the number of processing units in the cluster. Naval, air or ground platforms can be selected. Each platform has its own command and control from where all interactions between the various system models are controlled and where the timeline behaviour of these systems can be observed.

Models can be added or modified, and the user can expand the library as needed. SEWES is constantly being used and expanded by a community of defence evaluation and research institutes, ensuring that the models and simulations are valid. The fidelity of the models can be tailored to suit the correct level required, saving time and money.

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