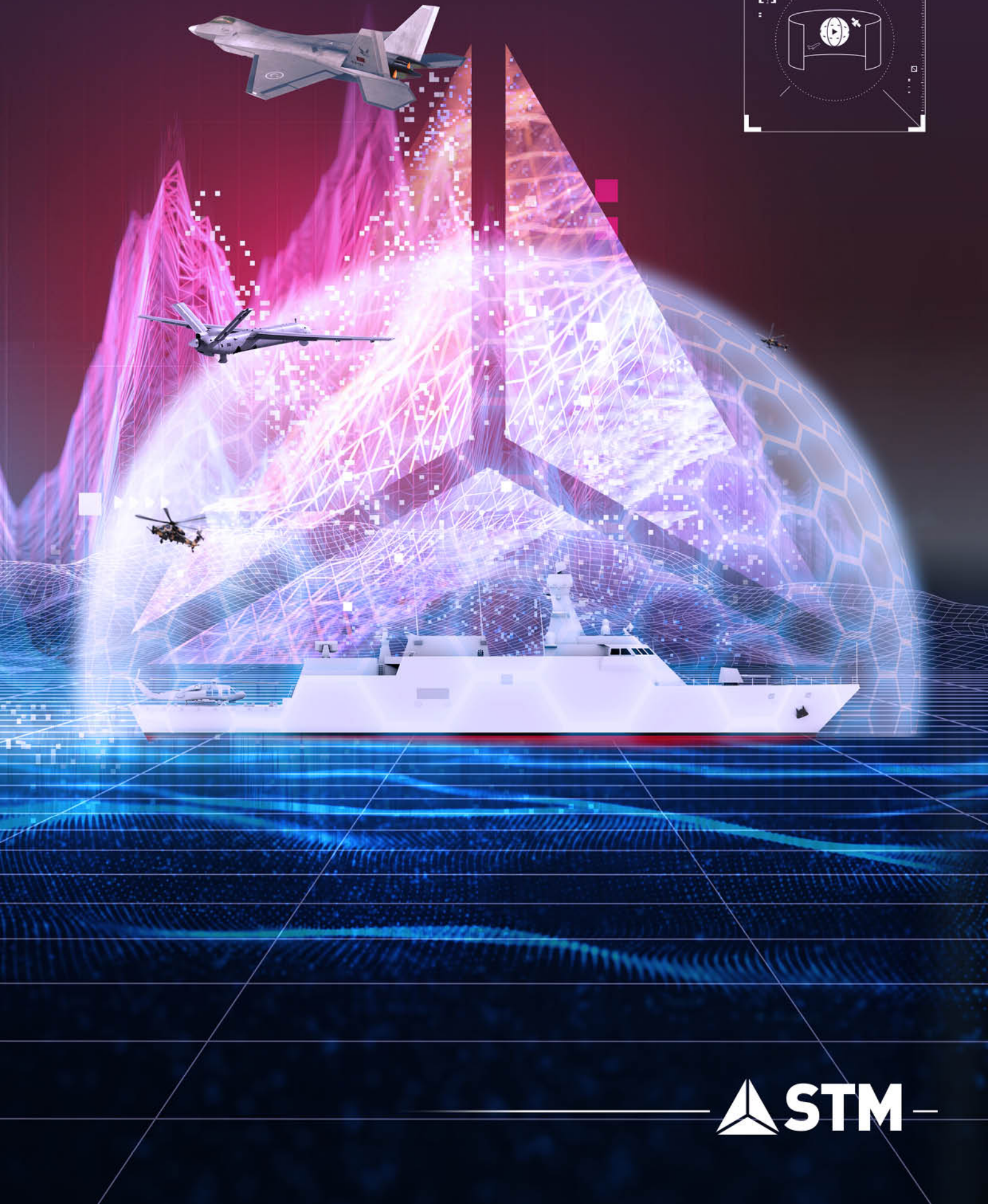
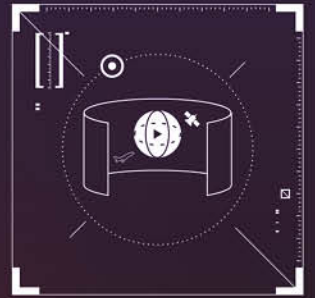


# SIMULATION AND DECISION SUPPORT









## **STM Savunma Teknolojileri, Mühendislik ve Ticaret A.Ş.**

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STM was established in 1991 for the provision of project management, system engineering and consultancy services to the Defense Industry Agency (SSB) and the Turkish Armed Forces (TAF).

The SSB continues to be the majority shareholder in the company, which has a workforce of 850 people, 63 percent of whom are engineers.

STM is among the leading companies operating in the defense sector, and is engaged in projects, particularly in the fields of naval platforms, tactical mini UAV systems, cybersecurity and IT services, command and control projects, satellite technologies, military aviation, radar and electronic warfare, and procurement and consultancy services.

Aside from its involvement in many national projects being conducted by the Turkish defence sector, STM is also engaged in export and business development activities for NATO with operations in more than 30 countries.

In addition to acting as the main subcontractor in the MiLGEM Project for the development of Türkiye's first national corvette, STM is also carrying out the detailed design as the main contractor in the project for the construction of TCG İSTANBUL (F-515), Türkiye's first national frigate.

STM has undertaken important tasks in submarine modernization and construction projects for the Turkish Navy, and is also responsible for Türkiye's first submarine modernization export, taking the lead role in the Pakistan AGOSTA 90B project.

STM developed KARGU, Türkiye's first indigenous attack UAV System, and launched Türkiye's first Cyber Fusion Center in 2016.

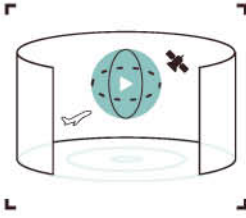
Through the INTEL-FS2 Project, STM ensures the flow of intelligence between all NATO headquarters around the world, and is successfully engaged in one of Türkiye's largest software exports to the Organization.

STM diversifies its technology-based activities to meet the needs of the public and private sectors – in particular those related to the Turkish defense sector.

STM is headquartered in Ankara, the capital of Türkiye, and continues its operations out of nine facilities, located in İstanbul, Gölçük and Ankara, as well as Pakistan.

STM was for three consecutive years listed on the Defense News Top 100 list of the world's top 100 defense companies.





# SIMDES

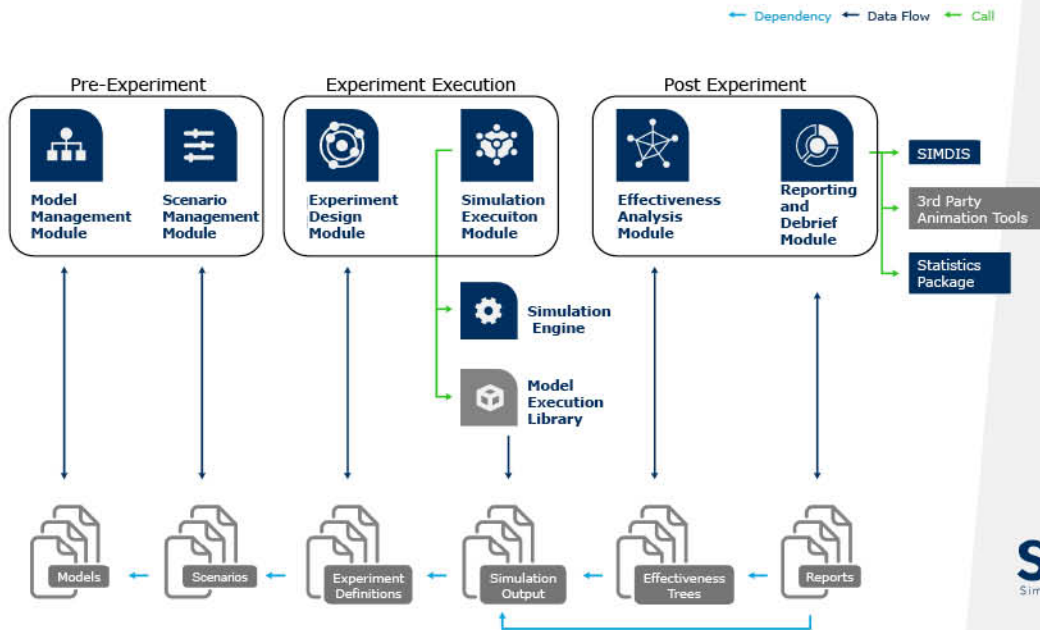
## Simulation Based Tactical Decision Support System

SIMDES is a simulation-based decision support software developed for the purpose of designing, running and analyzing different scenarios for the evaluation of tactical and operational level combat effectiveness. SIMDES performs multiple runs of a main scenario defined by the user with different variations where its modules provides scientific analysis methods of simulation results.

SIMDES consists of software modules that cover all simulation-based decision support needs:

- Model Management Module
- Scenario Management Module
- Experiment Design Module
- Simulation Execution Module
- Effectiveness Analysis Module
- Reporting and Debrief Module

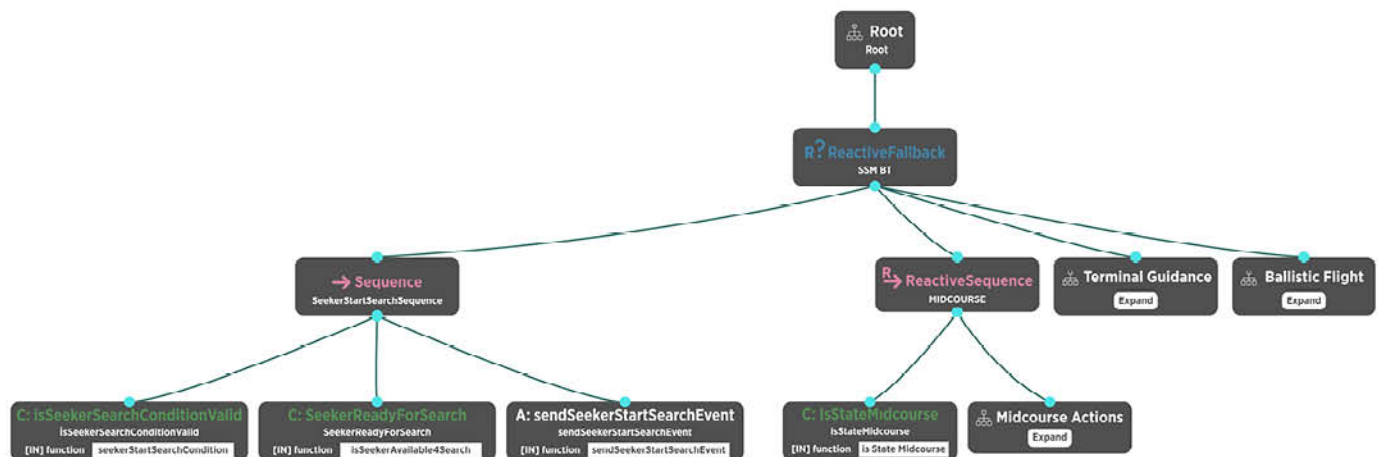
Owing to the modularity, scalability and reusability features of SIMDES software architecture, it can meet the simulation needs in different usage areas.



# Model Management

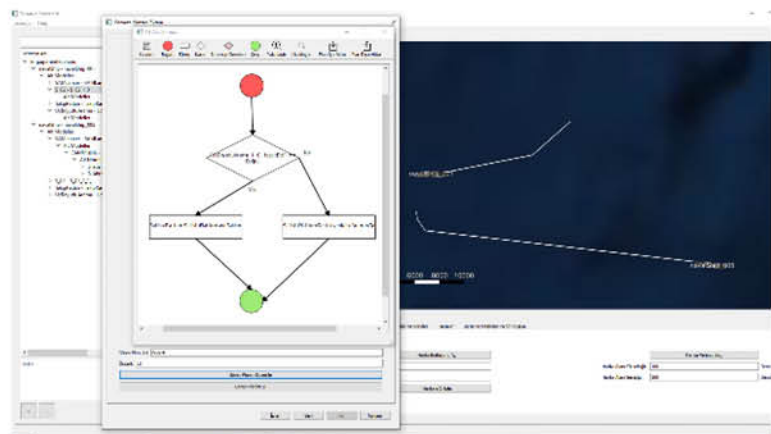
## Model Management

- Generic model approach for defining combat elements and subsystems
- Ability to use the defined models in different scenarios
- Enabling reuse of models and creating new models with layered model abstraction architecture



## Scenario Management

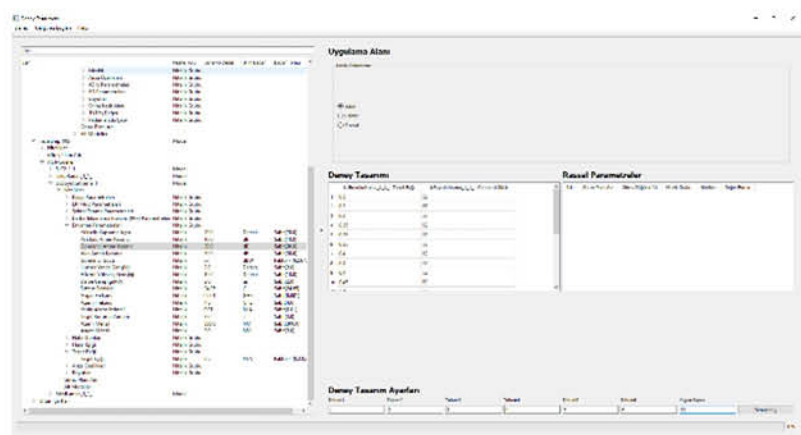
- Creation of the scenario to be used as a reference for multiple runs
- Definition of the initial conditions of the scenario scene (space, time, trigger event definitions, conditional behavior definition, behavior lists, task selection, etc.)
- Definition of task plans and conditional events list



## Experiment Execution

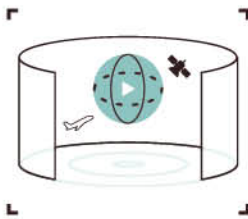
### Experiment Design

- Definition of experiment factors (input parameters whose effect on the test result will be analysed).
- Selection of parameters and random effects that are desired to be noise resources



## Simulation Execution

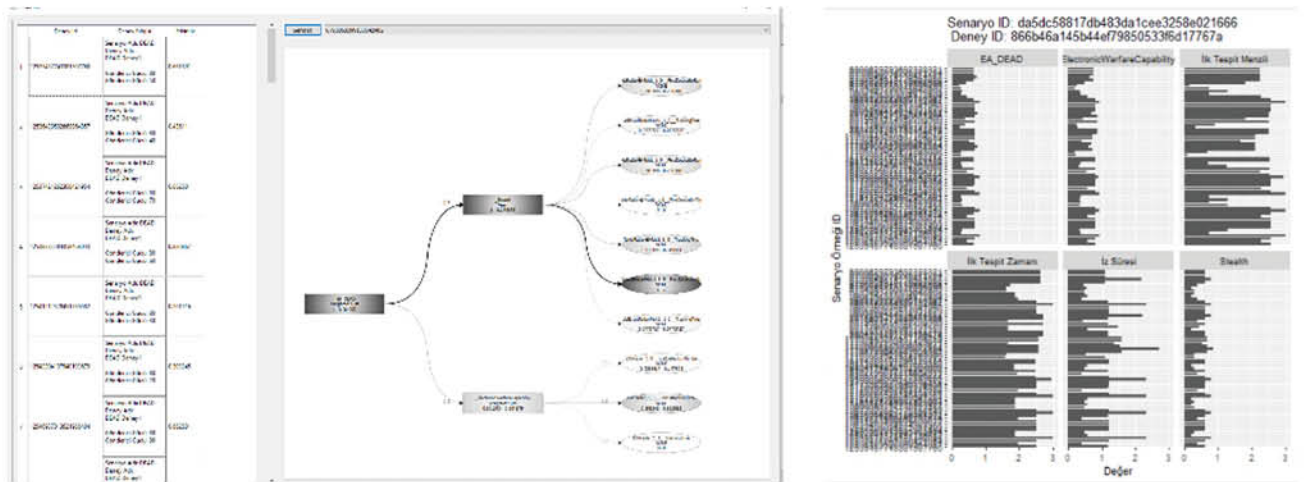
- Operation of the scenario multi-run defined in the experiment design
- A hybrid simulation operation using discrete event and discrete time methods
- Sequential and parallel multi-run support, faster than real-time simulation execution capability
- Infrastructure that uses pseudo-random number generators; provides manageable randomness and reproducible results
- Saving all simulation output to the database for analysis



## Post Experiment

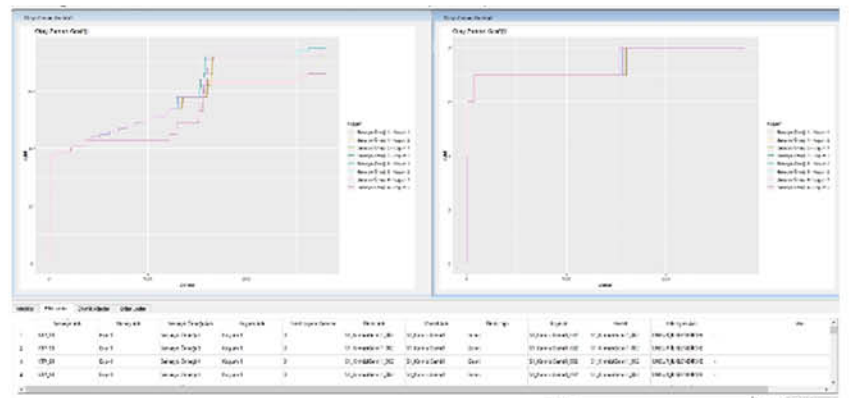
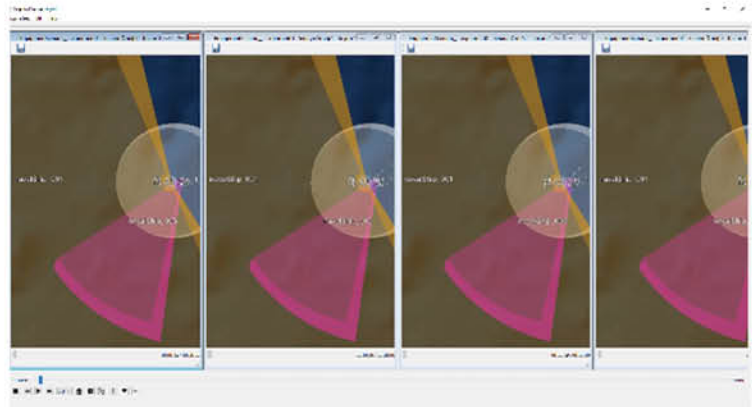
### Effectiveness Analysis

- Definition of performance measures and measures of effectivity
- Unique effectiveness tree approach that combines multi-criteria decision making methods
- Analysis of the simulation data with effectiveness tree
- Comparative analysis of the factors affecting mission performance

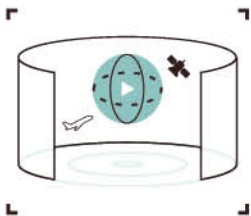


### Reporting and Dbrief

- Objective reporting based on statistical methods over simulation output
- Replay of scenario records (3D animation generation)
- Coordinated playback of more than one scenario sample, providing visual tracking of the differences between the samples.





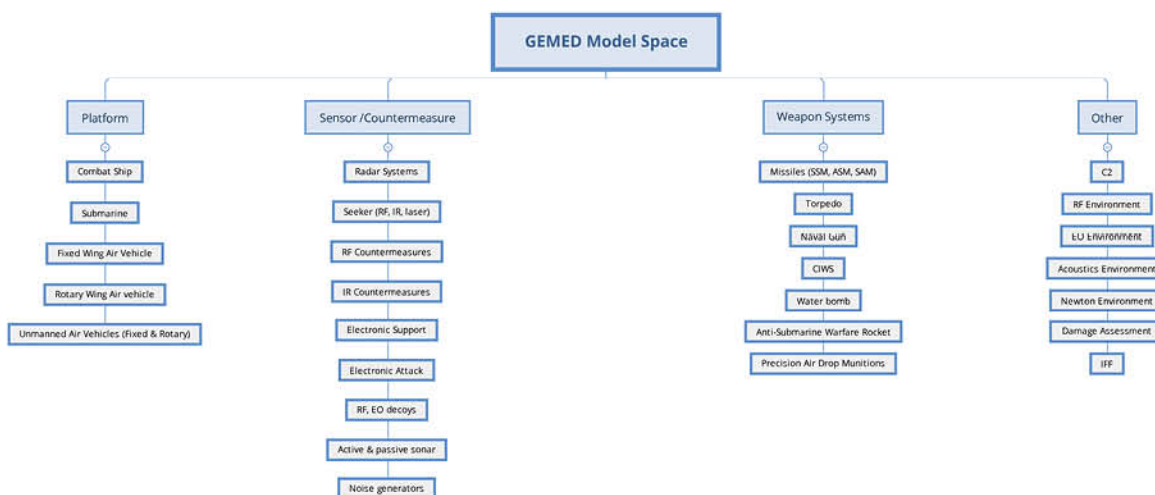


# GEMED

## Naval Warfare Effectiveness Analysis Model

**Naval Warfare Effectiveness Model (GEMED);** developed on **SIMDES** infrastructure; is a simulation system with engineering level resolution in which effectiveness of combat platforms can be measured in an integrated synthetic tactical environment. With the scenarios created, GEMED can be used for combat effectiveness evaluation, ship design/modernization, decision support for procurement and tactical development purposes.

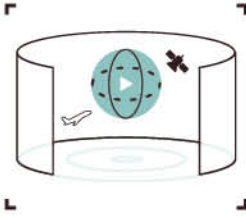
Within the scope of the GEMED model, nearly 100 generic models of combat elements and their subsystems have been developed. Gemed user can perform combat effectivity analyses for surface, underwater and air operations by selecting from generic model database, and including them in their scenarios.



More than 40 mission implementations have been carried out for air, above-water and under-water operations. During the scenario creation phase, the user is provided with the ability to assign tasks to the relevant platform models and to create a task plan that conditionally allows switching between tasks.

With GEMED, the user can make multiple-runs by creating scenario variants for system configurations, decision mechanisms, behaviors and random effects around the main scenario. The resulting simulation big data can be analyzed with statistical and multi-criteria decision making techniques.





# SARGUS

## Synthetic Aperture Radar Surveillance Satellite Payload Simulation Development

Synthetic Aperture Radar Satellite Payload Simulation Development Project (SARGUS) has been developed as a simulation tool for SAR satellites in low earth orbit missions. SARGUS software provides two main capabilities as SAR payload simulation and satellite mission analysis. Furthermore, mission planning for SAR satellite missions, effective training of satellite operators, performance analysis for planned satellite missions and design support for SAR payloads are the primary usage areas of the SARGUS software.

SARGUS has a high fidelity SAR model which receives orbit data from trajectory models in order to create synthetic SAR raw data for the engaged target scene defined in the scenario. SARGUS can process both synthetic and real SAR raw data and produce SAR images. In mission analysis module, SARGUS can perform fundamental satellite mission analysis of Electro-Optic and SAR payloads for single satellite and constellation of satellites.





## MAIN CAPABILITIES

Creating scenario	It is a software with the possibilities to create a new scenario by the user, to reorganize and save the created scenario to be optimized.
Creating satellite model	New satellites can be added to the scenarios. It is designed to suit the multi mini satellite concept. If desired, 3D models of satellites can be added and visualised. Visiting times can be calculated on the defined target area for single and multi mini satellite missions.
Coverage Analysis and Revisit Time Calculation	Frequency of re-visits of satellites within the target area can be calculated. Groundtrack and potential scanning widths can be shown on 2D and 3D surface models.
Ground Station Coverage Calculation	Interactions between satellite and ground station can be calculated. It can be presented to the user in tabular form.
Synthetic SAR Image Generation	It can create synthetic raw SAR images of objects defined by the user and process these images.
SAR image Processing	It has the capabilities to process raw SAR images created by real satellites and present them to the user.

## STM SAVUNMA TEKNOLOJİLERİ MÜHENDİSLİK VE TİCARET A.Ş.

📍 Mustafa Kemal Mahallesi 2151. Cadde  
No: 3/A Çankaya / ANKARA / TURKEY

☎ +90 312 266 35 50

📠 +90 312 266 35 51

[www.stm.com.tr](http://www.stm.com.tr)

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