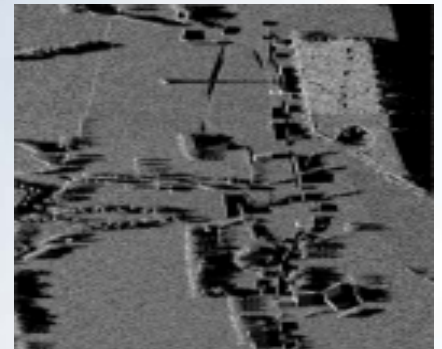
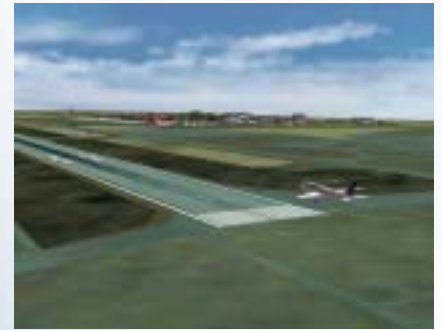


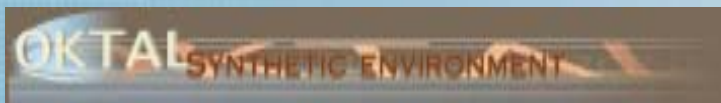
OKTAL-SE

The Synthetic Environment
and Sensor company

Company presentation



August 2005



SOGECLAIR
Ingénierie de haute technologie



OKTAL-SE

**Synthetic Environment modelling
Software for sensors simulation
Skilled services**

*Leading the way of physical simulation
in Europe*

OKTAL SYNTHETIC ENVIRONMENT

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A SOGECLAIR group company...

CLAIRIS TECHNOLOGIES

EDT

THARSYS

SOGEMASA (E)

HEE (D)

Product Engineering (83%)

Consolidated TO 2004: 45 M€ (600 p)

SOGECLAIR

CEO : Philippe Robardey

SIMULATION (17%)

Simulation & Virtual Reality

OKTAL

CEO Christian Torrell

107 p

Synthetic Environment & Sensors

OKTAL-SE

CEO: Jean Latger

27 p

OKTAL SYNTHETIC ENVIRONMENT

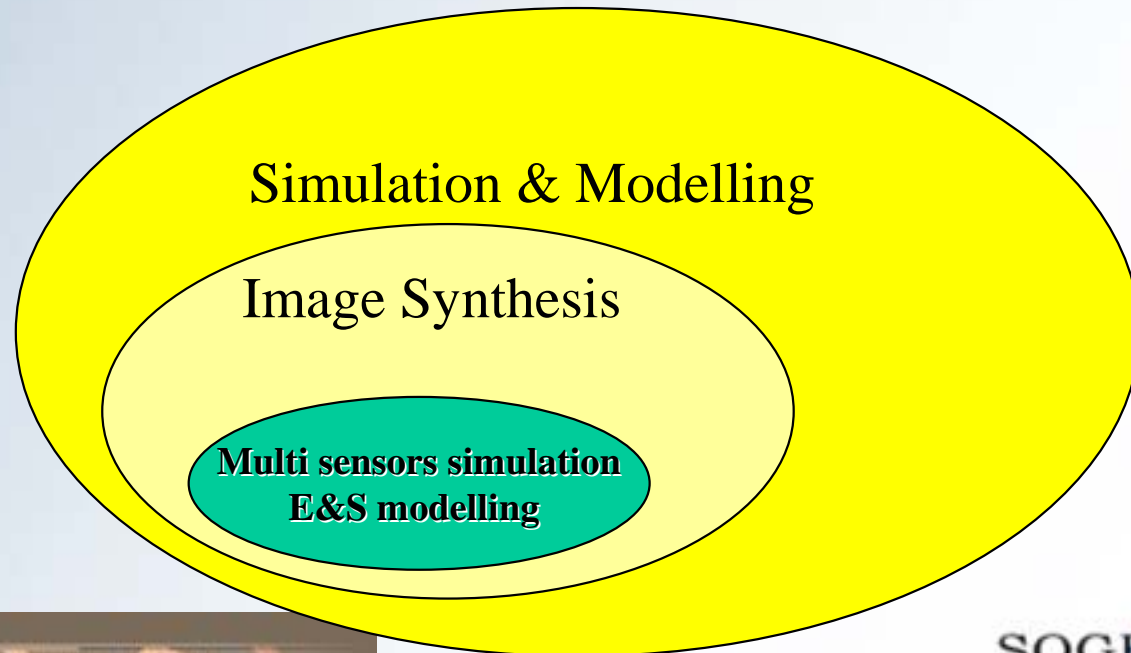
SOGECLAIR
Ingénierie de haute technologie



Member of its SIMULATION pole...

Specific identity of its own

Small **flexible** and **reactive** structure specialized in **simulation** with strong **scientific added value** based on **Image Synthesis technologies** applied to **multi sensors simulation domains** and **Synthetic Environment modelling (E&S)**





OKTAL-SE key features

Name: OKTAL-SE (Oktal Synthetic Environment)

Mission statement: Editor of specialized software products with strong technical and scientific added values.

Strategy: Open the international market through its « technological niche » while consolidating its position on the French civilian and military market to become one of the world leaders in physical simulation.

Founded : February 2001 in Toulouse

Capital : 754 k€

Manpower : 27

TO 2001: 1,9 M€

TO 2002: 2,1 M€

TO 2003 : 2,1 M€

TO 2004 : 2,2 M€

150 k€R&D

210 k€R&D

Quality Engagement : ISO 9001 V2000 (AFAQ)





Which skills ?

3 strong and established skill levels

Sensor Simulation Software

- Software catalogue
- Dedicated training
- Specific studies
- Training Sessions
- Associated maintenance

Skilled Services

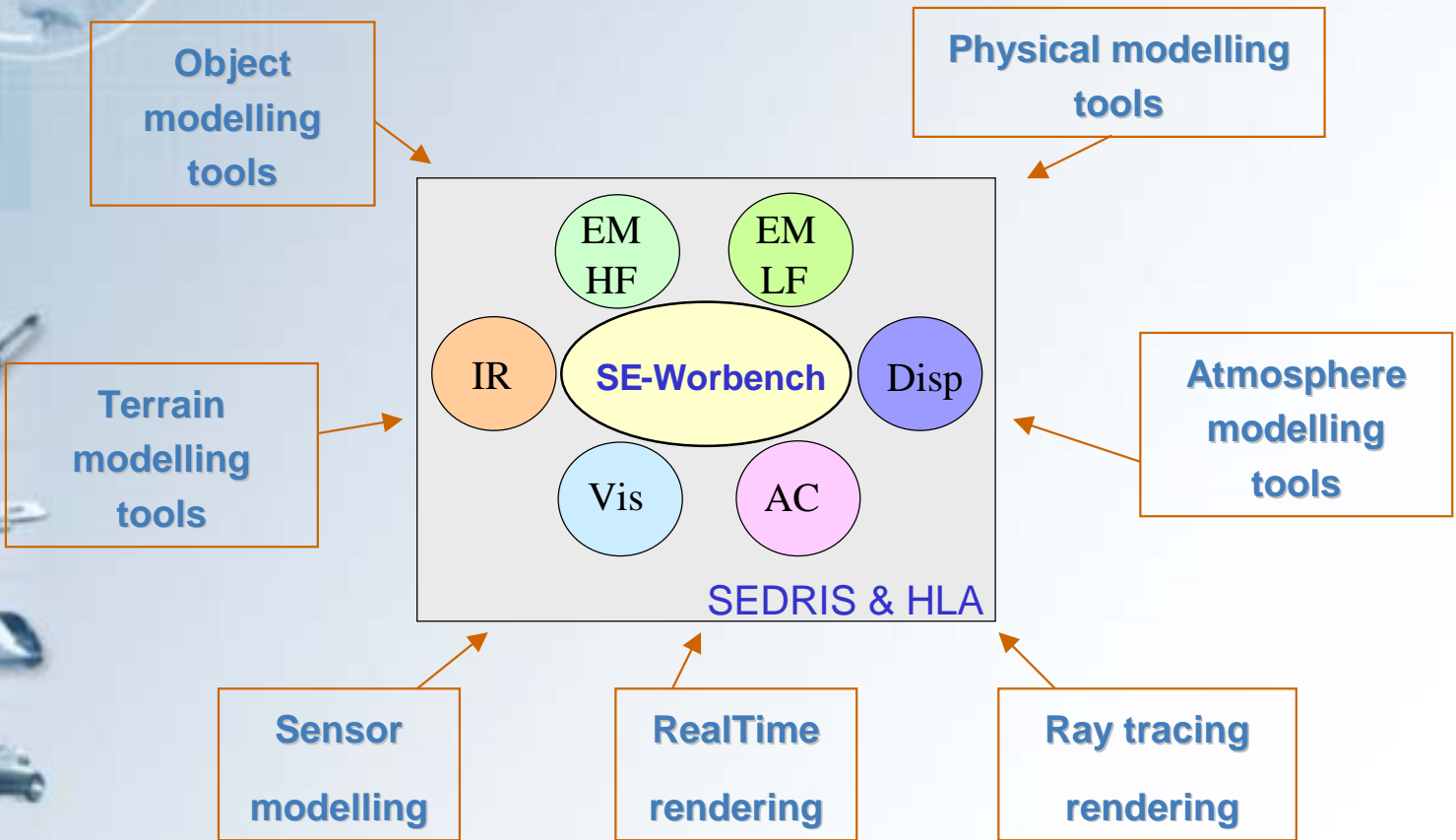
- Scientific studies
- Customized consulting
- Specific development
- Software integration
- Hardware integration

Synthetic Environment Modelling

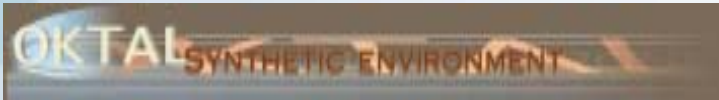
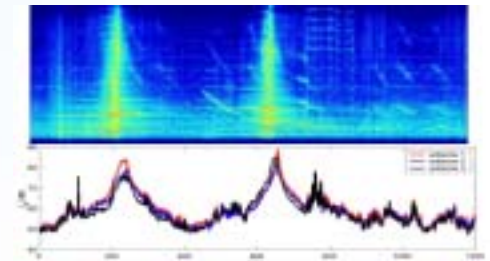
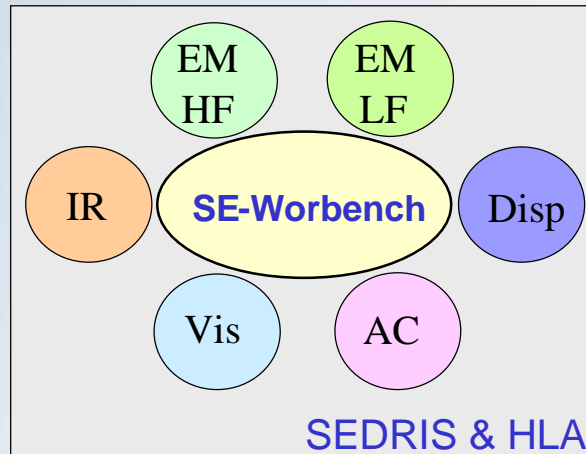
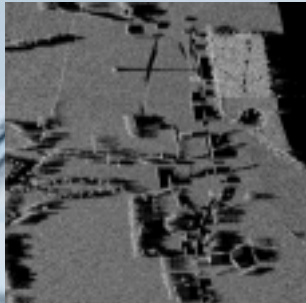
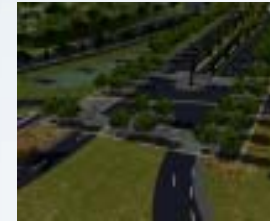
- 3D Terrains & Object catalogue
- On demand production of 3D virtual mock-ups
- Physical characterisation
- Atmospheric modelling



Federate in a unique workbench...

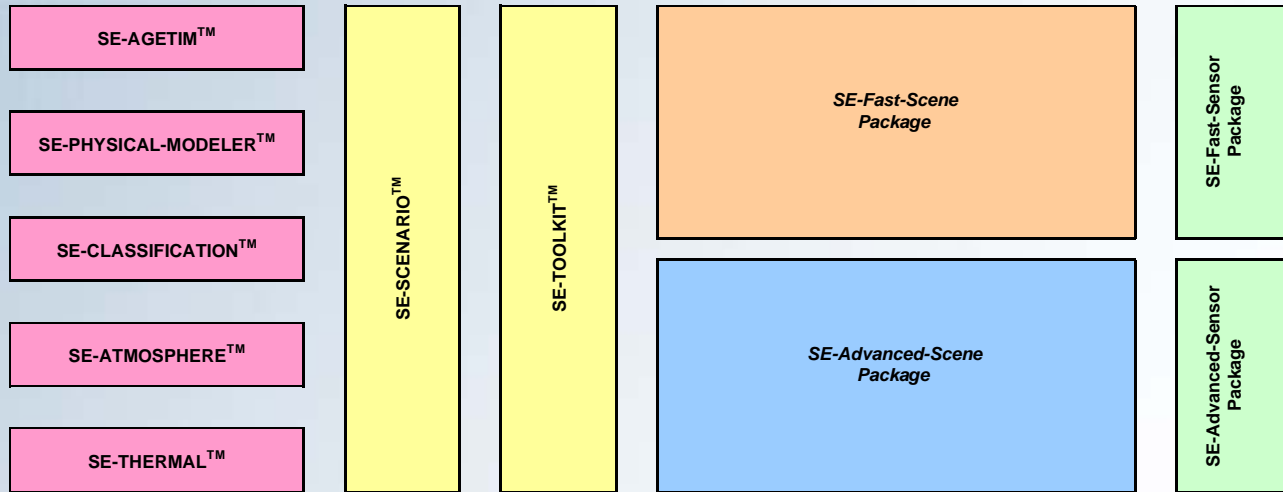


... The SE-WORKBENCH



... The SE-WORKBENCH

SE-Workbench view for all sensors



Synthetic Environment modeling

Scenario editing & preview

Software integration

Scenes generation

Sensors integration

- Synthetic environment modeling
- Scenario editing and preview, software integration services
- Real time exploitation
- Non Real Time exploitation
- Sensor effects modeling and integration



For which markets ?

2 markets and 3 domains



Study or research simulation

Optronic domain
(visible, infrared, NVG)
Electromagnetic domain
Acoustic domain

Training simulation

Optronic domain
(visible, infrared, NVG)
Electromagnetic domain

And which customers?

3 kinds of customers

The civilian and defence industries that integrate our solutions in complex systems with strong technical added value:

- France Télécom R&D
- Renault Recherche
- MBDA
- SAGEM
- Dassault
- SNECMA
- EADS
- OKTAL
- BGT
- LFK

The French or foreign MOD through their technical expertise centres and their program services:

- SPART
- SPAé
- SPOTI
- CELAR, ETBS, ETAS, CTA, CEG, LRBA, CEV
- WTD81
- FMV
- MOD South Korea

And which customers?

3 kinds of customers

The French or foreign both civilian and defence research centres:

- ONERA
- FOI
- FGAN
- CEA
- CNES
- ISL

1 way to develop R&D

French or European programs
Management organisation

- ESA/ESTEC
- EU FP xxx programs
- RNRT, RNTL projects with research and industries ministries
- PREDIT projects



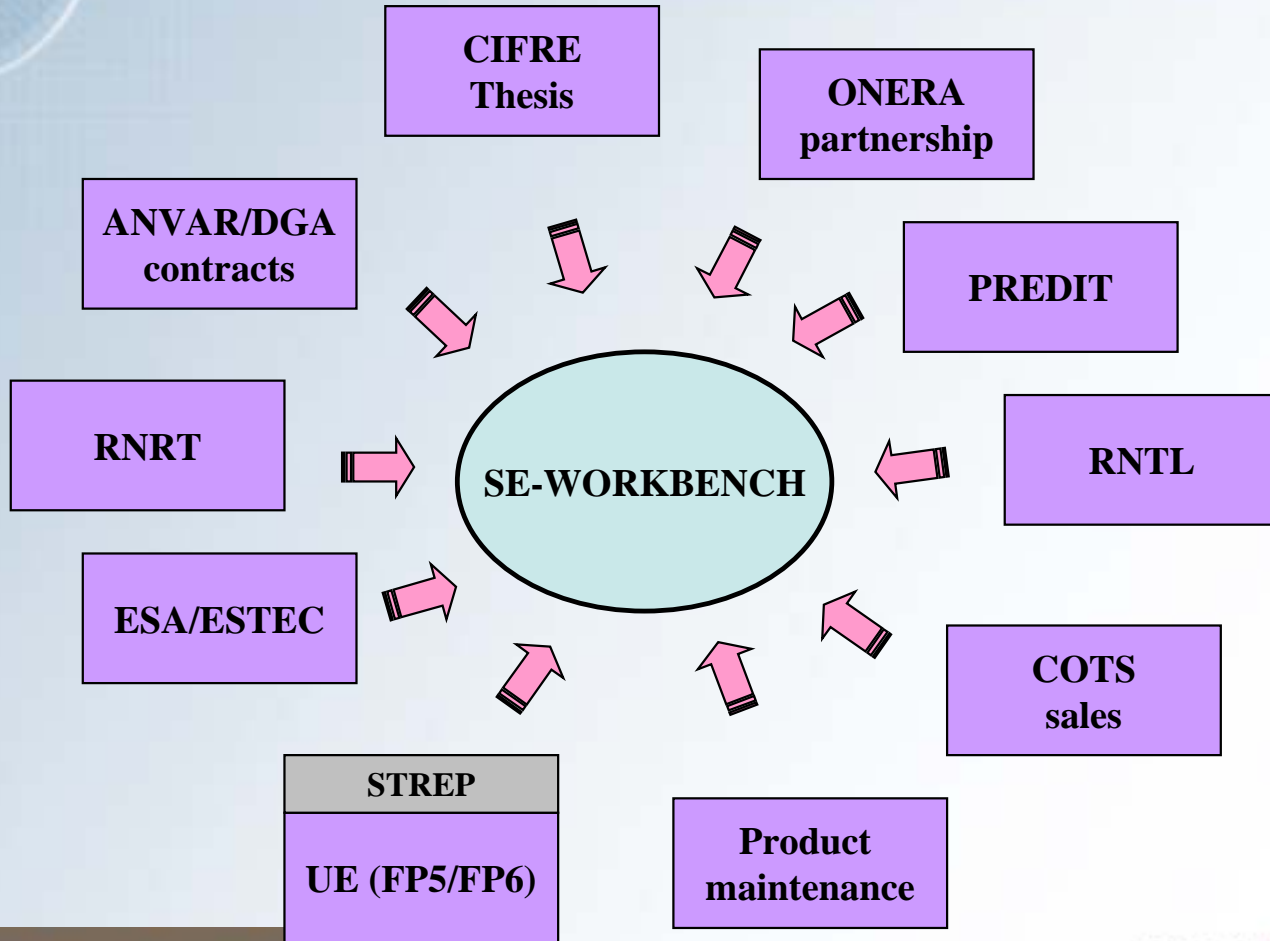
Established project references

Project references known in an international context

- **MBDA, DGA, DSTL (France , UK):**
Synthetic Image Generator System (SIGS for Storm Shadow / Scalp EG)
- **DGA/DCE (France):**
CHORALE (CHamp de bataille Optronique, Radar, Acoustique simuLE)
(simulated acoustic, radar, optronic battlefield)
- **SAGEM (France):**
Simulation tools and 3D sites for IR AASM auto-director validation
- **DoD South Korea (South-Korea):**
Synthetic Image Generator System (SIGS) for IR simulation
- **FMV / FOI (Sweden):**
EM study simulation tools
- **BWB / WTD81 FGAN (Germany):**
EM and IR study simulation tools
- **FGAN (Germany):**
EM and IR study simulation tools
- **IABG (Germany):**
IR simulation tools for studies



Strong R&D for the products' benefit





Through a worldwide sales agents net...

Sales agent & Distributors & Direct Sales





Through a worldwide sales agents net...

Sales agent & Distributors & Direct Sales



... Oktal Synthetic Environment: **contacts**

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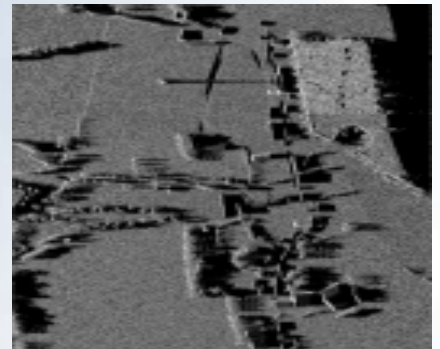
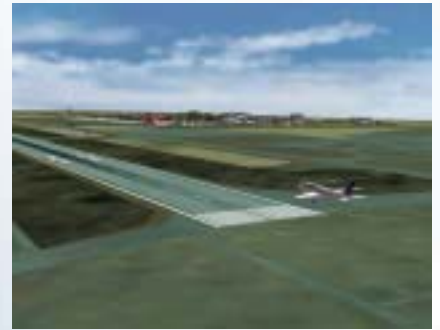
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Additional information



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Contract typology order

1) COTS

- Sales of SE-WORKBENCH products for study or research
- Sales of SE-WORKBENCH products as components for training simulators

2) Maintenance / Support / Training

Associated to the previous products sales

3) 3D virtual mock-up:

Missile sites – launching camps – urban combat zone
Urban zone for telecommunication –
Other geographical zones (countryside and urban).

3 types of mock-ups: geo specific, geo typical and generic

4) R&D contracts

FP (5/6), PREDIT, COS, ESTEC, ANVAR/DCI, CIFRE,
Post Doc, DRT

5) Study contracts

SEDRIS, SIFF, Weather, stereoscopy,
3D Non real Time visualisation, 3D real Time visualisation

Synthetic Environment

Military terrain modelling

Infrared simulation

Missile infrared auto director: study, validation, qualification

Hot-cavities study: engine signature study

Infrared countermeasures and battlefield obscurant

Indoor artillery training with infrared embedded sensors

Urban Warfare training with infrared/NVG embedded sensors

Infrared image recognition and target identification training

Electromagnetic simulation

Missile EM and SAR auto directors: study, validation, qualification

Electromagnetic countermeasure studies

RCS and propagation studies

Detection/Identification radar training

Intersystem EMC studies

Acoustic simulation

Recognition/Identification in open space (tanks, helicopters)

Recognition/Identification in urban environment (infantry, vehicles)

Synthetic Environment

Automatic airport terrain modelling

Visible simulation

Physical spectral vision (BRDF, fog effects)

Auto-stereoscopic vision (aircraft without windows, training)

Infrared simulation

FLIR and NVG training for aircraft/helicopter

Infrared countermeasures and laser blooming

Electromagnetic simulation

Antennas/Human compatibility studies

Airport Electromagnetic field calculation

Acoustic simulation

Human noise exposure in airport environment

TELECOMS

Synthetic Environment

Indoor and outdoor urban terrain modelling

Electromagnetic simulation

Antennas/Human compatibility studies

Strong/Near field simulation (GSM/UMTS human exposure)

Antenna implantation studies

SPACE

Visible simulation

High definition visible image production

Infrared simulation

High definition Infrared image production

Electromagnetic simulation

SAR images analysis for studies and training

Antenna and satellite structure coupling studies

Urban GPS reception modelling

POLLUTANTS

Synthetic Environment

Large terrain modelling

Pollutant dispersion simulation

NBC propagation in open space (landscape, urban environment)

Civilian exposure to daily life pollution

AUTOMOTIVE

Synthetic Environment

Road network automatic modelling

Sensor simulation

Obstacle detection through data fusion of lidar, infrared and radar sensors

URBAN PLANNING

Synthetic Environment

Automatic urban area modelling



The SE-Workbench and the spectral domain

The SE-Workbench manage the following spectral domain ...

 **IR** = visible + optronics [0,1 μm - 30 μm]

Workbench for fast infrared/NVG simulation


Workbench pour advanced infrared/NVG simulation

 **EM** = radar [3 mm - 1 m] = [0,3 GHz - 100 GHz]

Workbench pour RCS computation

Workbench pour global electromagnetic simulation

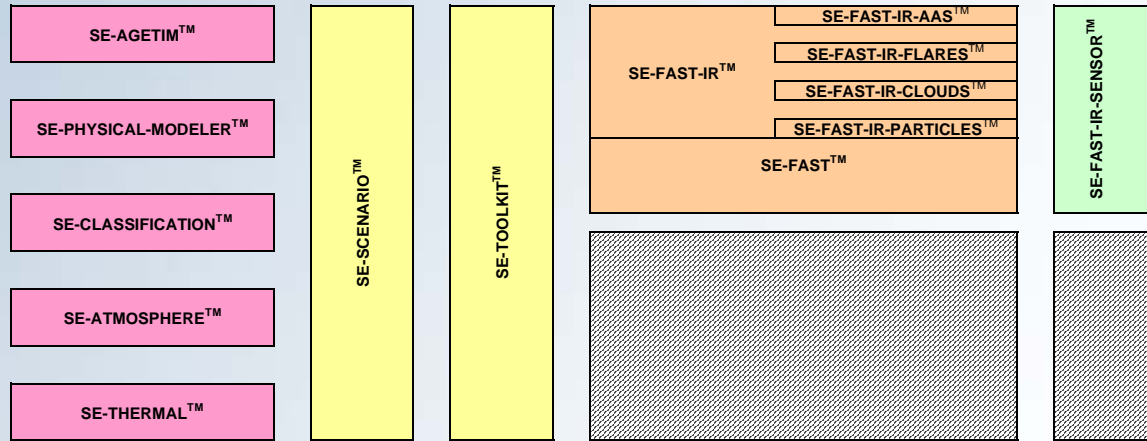
Workbench pour fast SAR simulation

 **AC** = acoustics [10 Hz - 20 000 Hz]

Workbench pour advanced acoustic simulation

The SE-Workbench view depending on the domain

SE-Workbench view for fast infrared/NVG simulation



Synthetic Environment modeling

Scenario editing & preview

Software integration

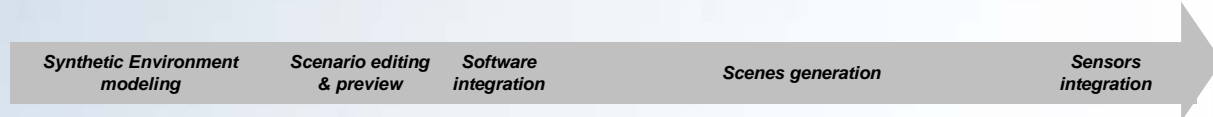
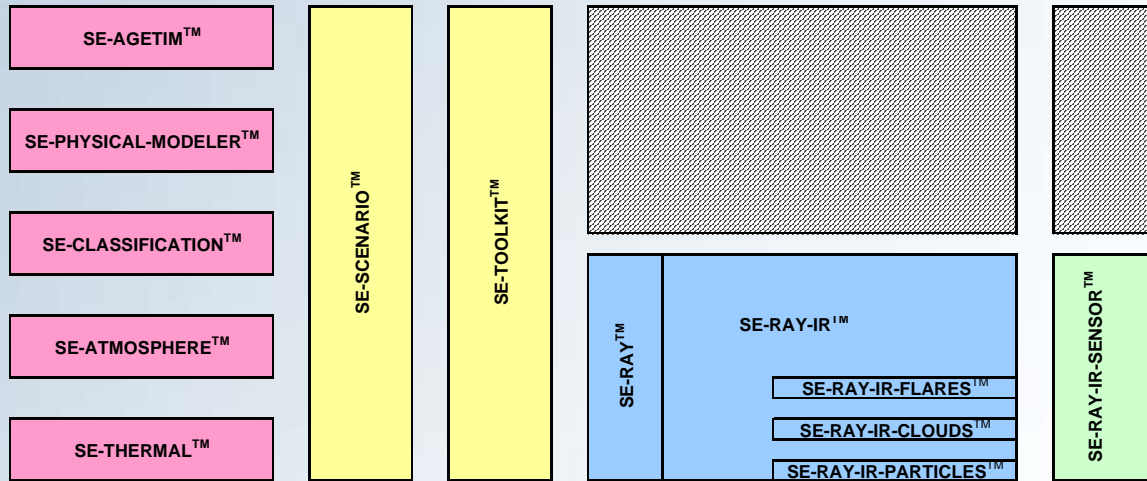
Scenes generation

Sensors integration

- Synthetic environment modeling
- Scenario editing and preview, software integration services
- Real time exploitation
- Non Real Time exploitation
- Sensor effects modeling and integration

The SE-Workbench view depending on the domain

SE-Workbench view for advanced infrared/NVG simulation

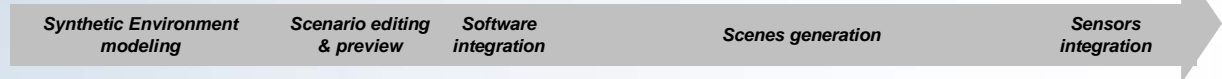
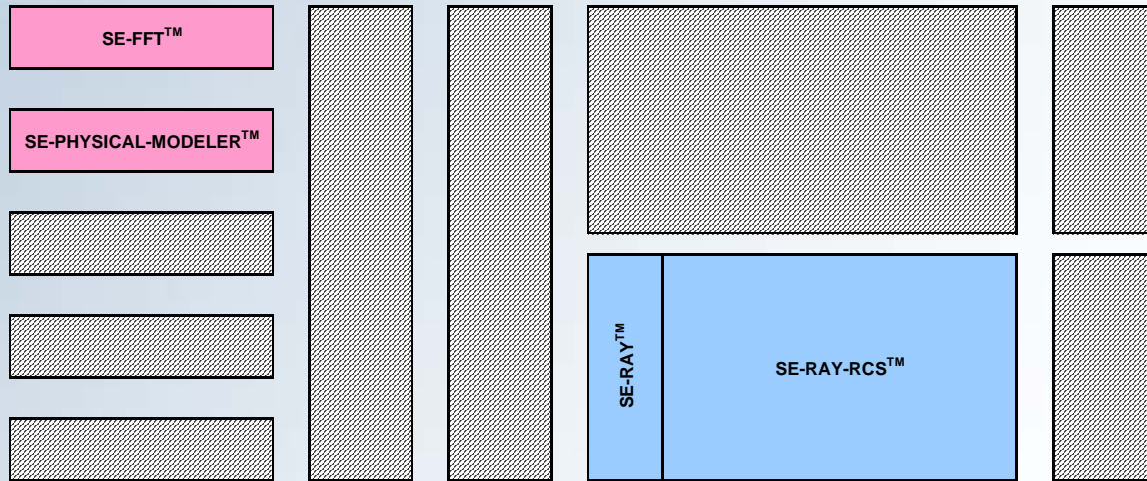


- Synthetic environment modeling
- Scenario editing and preview, software integration services
- Real time exploitation
- Non Real Time exploitation
- Sensor effects modeling and integration



The SE-Workbench view depending on the domain

SE-Workbench view for advanced SER computation

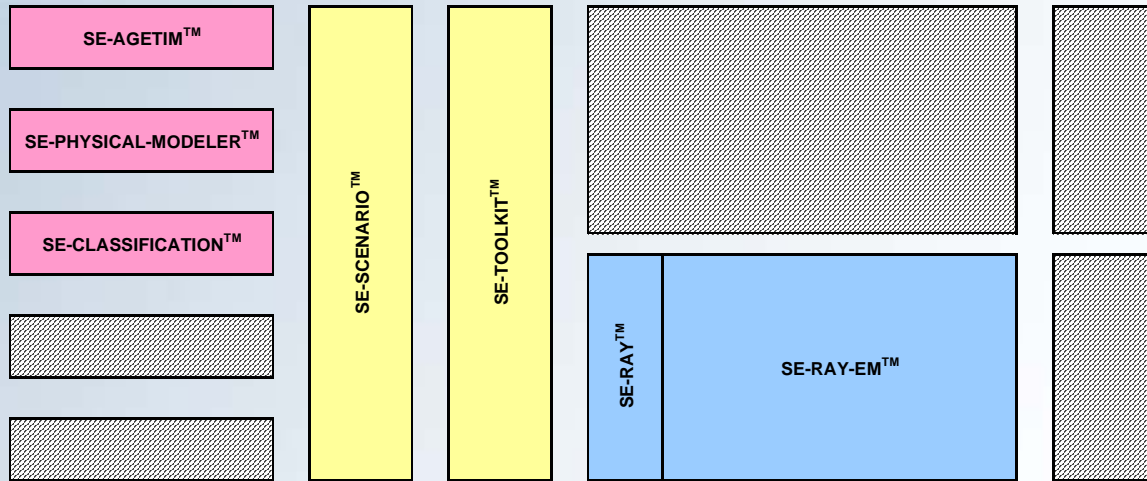


- Synthetic environment modeling
- Scenario editing and preview, software integration services
- Real time exploitation
- Non Real Time exploitation
- Sensor effects modeling and integration



The SE-Workbench view depending on the domain

SE-Workbench view for advanced electromagnetic simulation

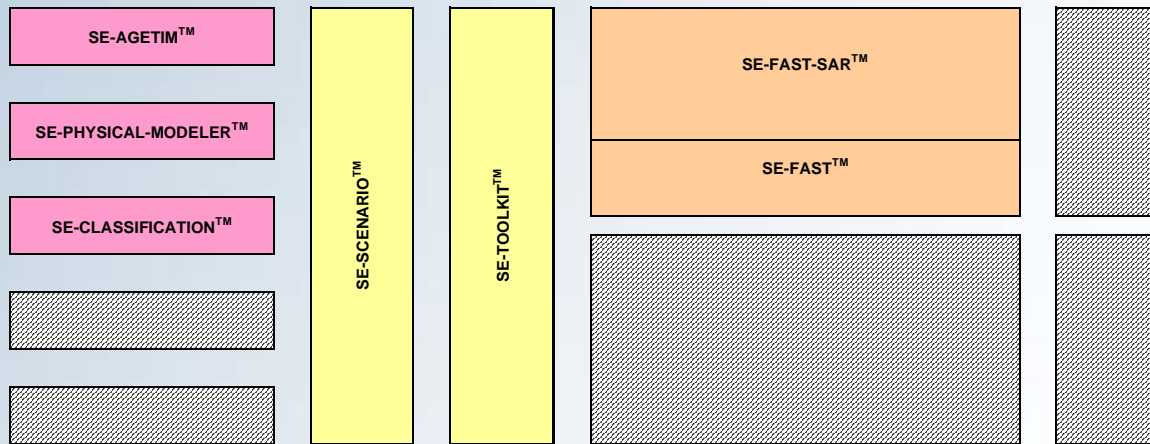


Synthetic Environment modeling
Scenario editing & preview
Software integration
Scenes generation
Sensors integration

- Synthetic environment modeling
- Scenario editing and preview, software integration services
- Real time exploitation
- Non Real Time exploitation
- Sensor effects modeling and integration

The SE-Workbench view depending on the domain

SE-Workbench view for fast SAR simulation



Synthetic Environment modeling

Scenario editing & preview

Software integration

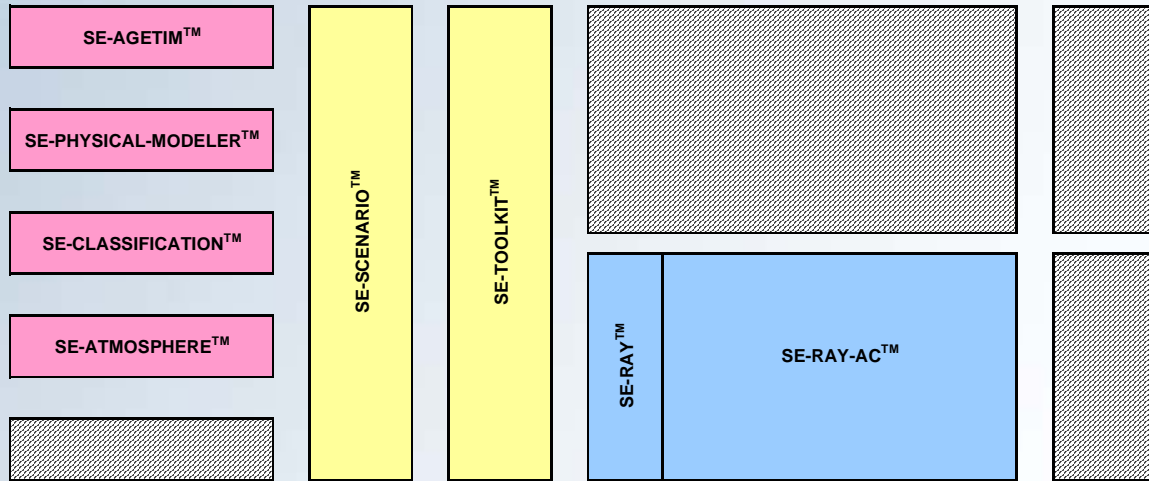
Scenes generation

Sensors integration

- Synthetic environment modeling
- Scenario editing and preview, software integration services
- Real time exploitation
- Non Real Time exploitation
- Sensor effects modeling and integration

The SE-Workbench view depending on the domain

SE-Workbench view for advanced acoustic simulation



Synthetic Environment modeling
Scenario editing & preview
Software integration
Scenes generation
Sensors integration

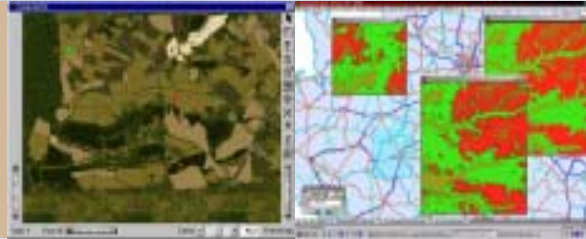
- Synthetic environment modeling
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SE-Workbench: Exemples of GUI

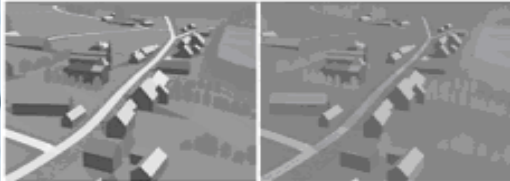
SE-AGETIM

Terrain modelling tool dedicated to multi-spectral and reconfigurable terrain generation process. Based on a reference GIS tool.



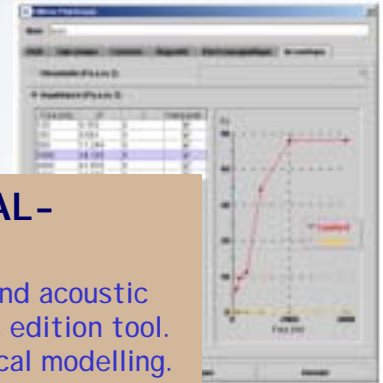
SE-THERMAL

3D scene temperature profile calculation taking into account the atmospheric conditions.



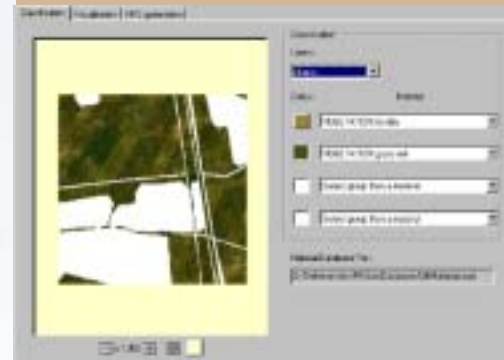
SE-PHYSICAL-MODELER

Infrared, radar and acoustic object properties edition tool. Enables geometrical modelling.



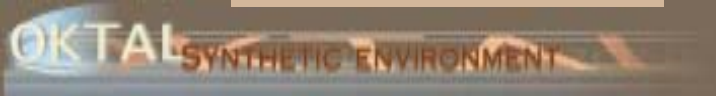
SE-CLASSIFICATION

Material based classification tool for the creation of multi-spectral textures from the visible picture.



SE-ATMOSPHERE


Atmospheric data computation based on standard codes: Lowtran/Modtran/French MOD-code



Unified environment for multi sensor simulation

- 
- **Same core data structure** with specific extensions
 - **Same user interfaces**
 - **A single synthetic environment for several sensors**
(Infrared, Electromagnetic, Acoustic)

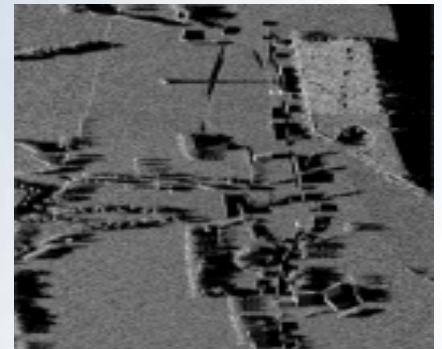
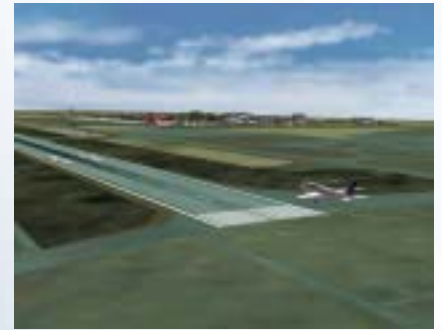
Real Time (OpenGL) Non Real Time (RayTracing) **duality**

- 
- *Make the most of both techniques*
 - ***Real Time** generates interactive scenario editing capabilities for **Non Real Time***
 - ***Non Real Time** provides accurate pre computation for **Real Time***

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*Specific and
detailed references*



August 2005

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... Oktal-SE & IR:SIGS for missile IR seekers

Context

Simulation of a critical component (e.g. IR sensor) of a complex system (e.g. missile)

Need

Optimize the development and the costs

Place in the system Life Cycle



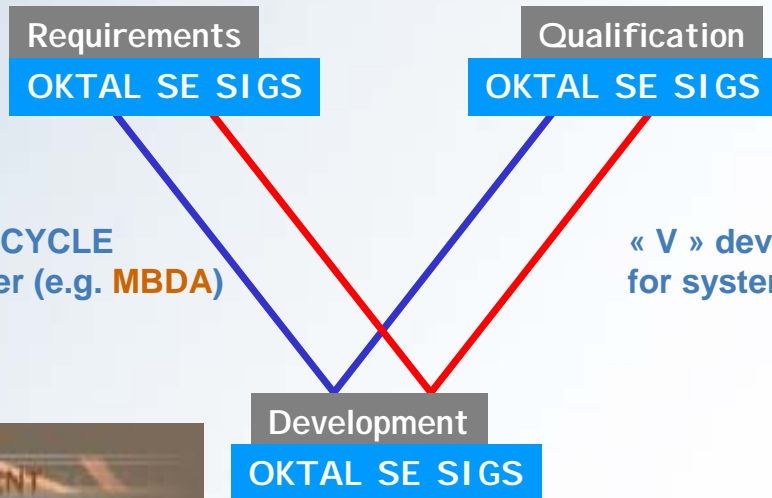
Band I

Band II

Band III

« V » development CYCLE for the system maker (e.g. MBDA)

« V » development CYCLE for system user (e.g. French MOD)



... Oktal-SE & IR:SIGS for missile IR seekers

What is SIGS :

SIGS is a set of IR modelling and rendering tools that enables the user to simulate IR sensor environments typically for missile application. SIGS is used both for Image Processing algorithm definition (Reference Model) and for hybrid simulation with the real equipment (HardWare In the Loop).

Duration :

SCALP & STORMSHADOW program : 1998 – 2002

2ASM program : Since 2001

Main users :

MBDA FR, MBDA UK, French MOD, DSTL
for SCALP & STORMSHADOW program,
SAGEM for AASM program

Success story :

Oktal-SE SIGS tool has been validated using French MOD facilities

Oktal-SE tool (SIGS) has been officially accepted and qualified by French MOD

Oktal-SE has produced many virtual mock-ups for STORM SHADOW program

Oktal-SE has developed many virtual mock-ups for AASM program





... Oktal-SE & IR: CHORALE IR story

What is CHORALE IR :

CHORALE IR is a comprehensive workbench including physical modelling tools for material IR characterisation, atmospheric tools, thermal software, ray tracing IR rendering engines and Open GL IR rendering engines.

Duration :

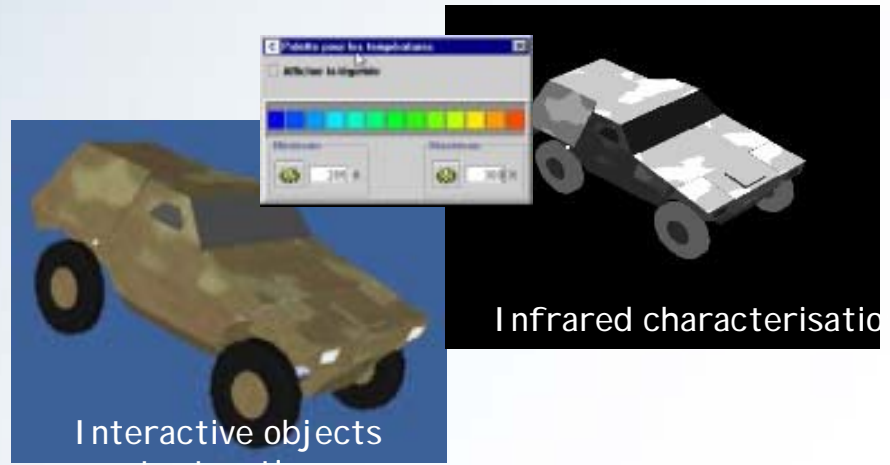
Since 1993

Main users :

French MOD: CELAR – ETBS
LRBA – ETAS – CTSN
CEG – CTSN

Success story :

Oktal-SE has a special agreement with French MOD : CHORALE IR is a transversal set of tools that is recommended by French MOD – French MOD sought OKTAL SE for maintaining the tools – Oktal-SE accepts to share all its R&D upgrades with French MOD in the scope of CHORALE IR.





... Oktal-SE & **SEDRIS**: SE-AGETIM & SEDRIS story

What is SE-AGETIM :

SE-AGETIM is a terrain modelling tools that enables the user to automatically create 3D virtual mock-ups with a key feature : the 3D databases are directly available for IR, EM and AC domains, which means that the physical attributes are automatically associated to the 3D databases.

Duration :

Since **1993**

Main users :

French MOD :

CELAR, LRBA, ETBS, ETAS, CEG, CEB

French defence companies : **MBDA**



Success story :

Oktal-SE is a « SEDRIS associate ». Oktal-SE is mandated by French MOD to control the SEDRIS conformity of all Defence French 3D databases for the next 3 years.

OKTAL SYNTHETIC ENVIRONMENT

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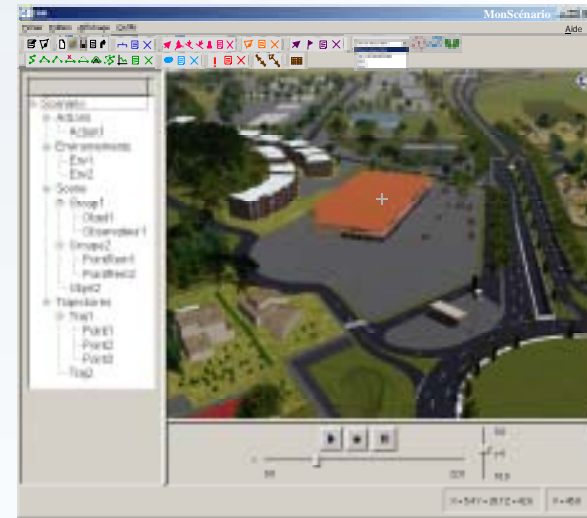


... Oktal-SE and Urban combat

Oktal-SE is a specialist in the automatic generation of urban 3D scenes (more than 400 virtual mockups) including the comprehensive modelling of inner parts of buildings.

Oktal-SE develops modelling scenario tools managing dynamic intelligent actor behaviors.

Oktal-SE provides its own software solution to take into account multi-sensor facilities.





... Oktal-SE and interoperability

Oktal-SE a « **SEDRIS** associate » that represents French MOD. **Static level**

SEDRIS stands for:
Synthetic Environment Data Representation and Interchange Specification

SEDRIS was initiated in 1994 by US DoD.

SEDRIS is a sort of language or method for unambiguously describing the environment, independent of whether the environment is geo-specific, geotypical, or completely fictitious. **SEDRIS** offers a mechanism for sharing the environmental data.

Oktal-SE has developed **SEDRIS** import/export modules and convertors to other standards like Open FLT or VRML.

Oktal-SE applies the **SEDRIS** concept for its 3D modelling tools and also for the way to extend geometrical data structures with physical extensions, especially for IR, EM and AC materials and for atmospheric data.



HLA stands for:
High Level Architecture

Dynamic level

HLA is the new Distributed Interactive Simulation standard that enables the user to make a network of interoperating simulators.

Oktal-SE represents PITCH, the European **HLA** reference, in France.



... Oktal-SE & EM : Advanced Electromagnetic story

What is EM Workbench :

EM-Workbench is a comprehensive workbench including physical modelling tools for material EM characterisation, and ray tracing EM rendering engines. The physical model has been developed with French ONERA and mixes Geometrical Optics and Physical Optics. The application field is wide : EMC, RCS, Antennas, Propagation, Telecommunication.

Duration :

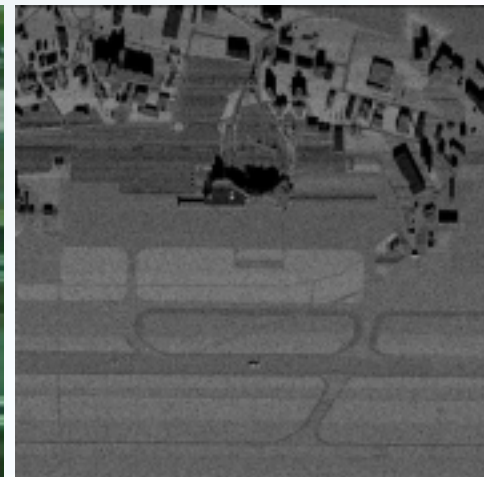
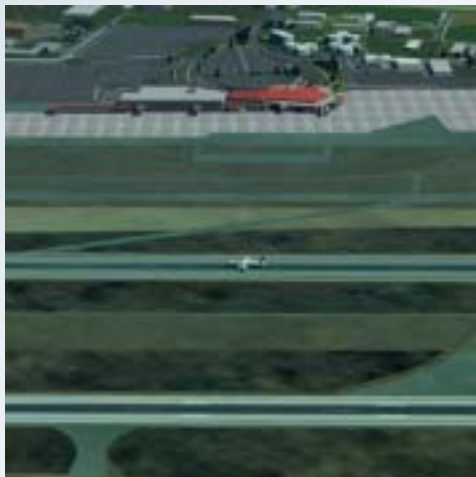
Since 1998

Main users :

ONERA,
French MOD:
CELAR - SPNuM

Success story :

EM-Workbench is the reference ONERA software in the scope of EM asymptotic methods. EM-Workbench is the kernel of SIRENA European Union project which concerns EMC simulation in the vicinity of the airport. This project is supported by EADS/Airbus.



OKTAL SYNTHETIC ENVIRONMENT

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... .. Oktal-SE & AC: CHORALE AC story

What is CHORALE AC :

CHORALE AC is a comprehensive workbench including physical modelling tools for material acoustic characterisation, atmospheric tools and ray tracing acoustic rendering engines. CHORALE AC enables the user to simulate the acoustic detection of targets in open field.

Duration :

Since 2002

Main users :

French MOD:
ETBS – ETAS - SPART

Success story :

The first results have been validated in collaboration with ISL : the virtual mock-up of the ETBS military terrain has been precisely modelled. On site, acoustic measurements have been successfully compared with CHORALE AC simulation.

