OKTAL-SE Corporate overview

OKTAL-SE

EO, RF, GNSS

the sensor simulation company

www.oktal-se.fr

OKTAL company history

1986 → 1989

- *Jean Latger + Thierry Cathala + 6 founders from **Thalès Training Simulation** (Thomson)=> Sogitec – Maya/Wavefront – OKTAL*
- *Design of first generation of 3D Graphic Boards*
  << Nvidia << Silicon Graphics << Evans & Sutherland

1989 → today

- ***OKTAL** birth (Jean Latger + Thierry Cathala)*
- *Design of first 3D terrain modelling tools*
- *Design of first Image Generators (SUN then SGI)*
- *Railway simulation (RT)*
- *Automotive simulation (RT)*
- *RT simulation for Town & Country Planing*
  - *Creation of the **OKTAL Environment** subsidiary*
  - *Creation of the **OKTAL Japan** subsidiary*
- *Defense simulation (RT & NRT) => First approach of SEDRIS*

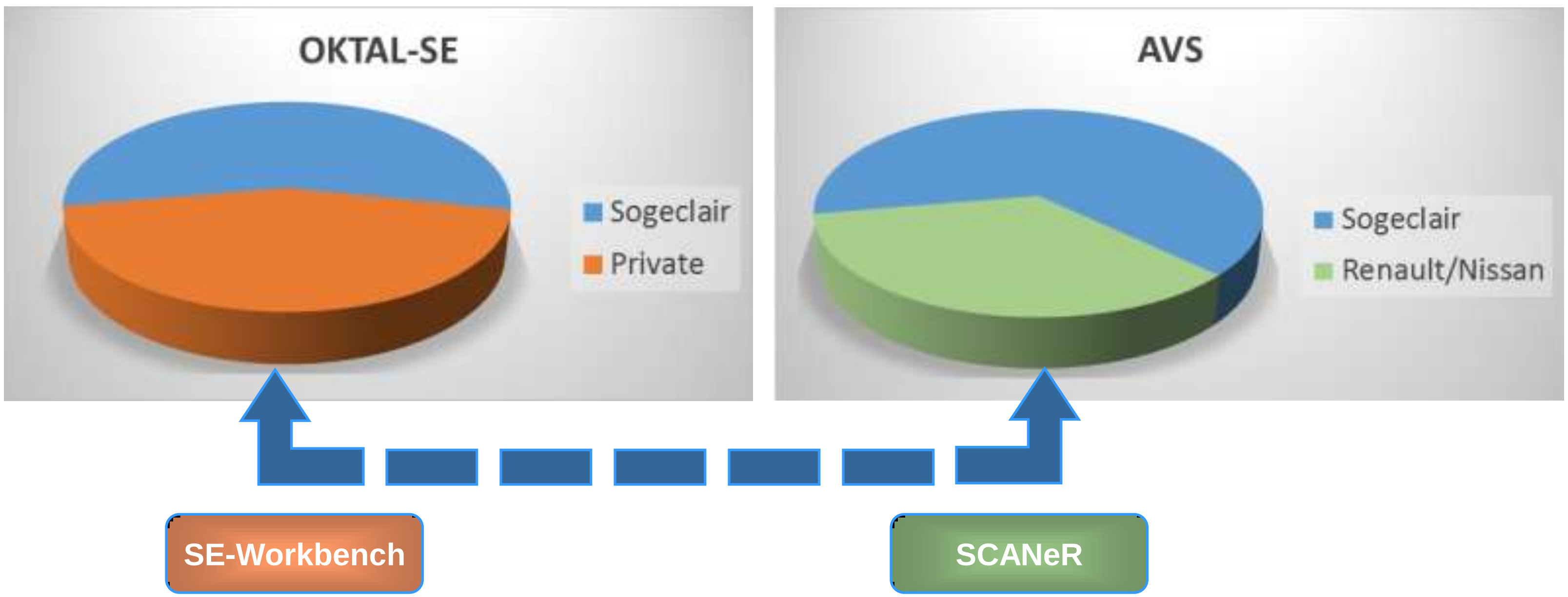
2001 → today

- ***OKTAL Synthetic Environment** birth (Jean Latger + Thierry Cathala)*

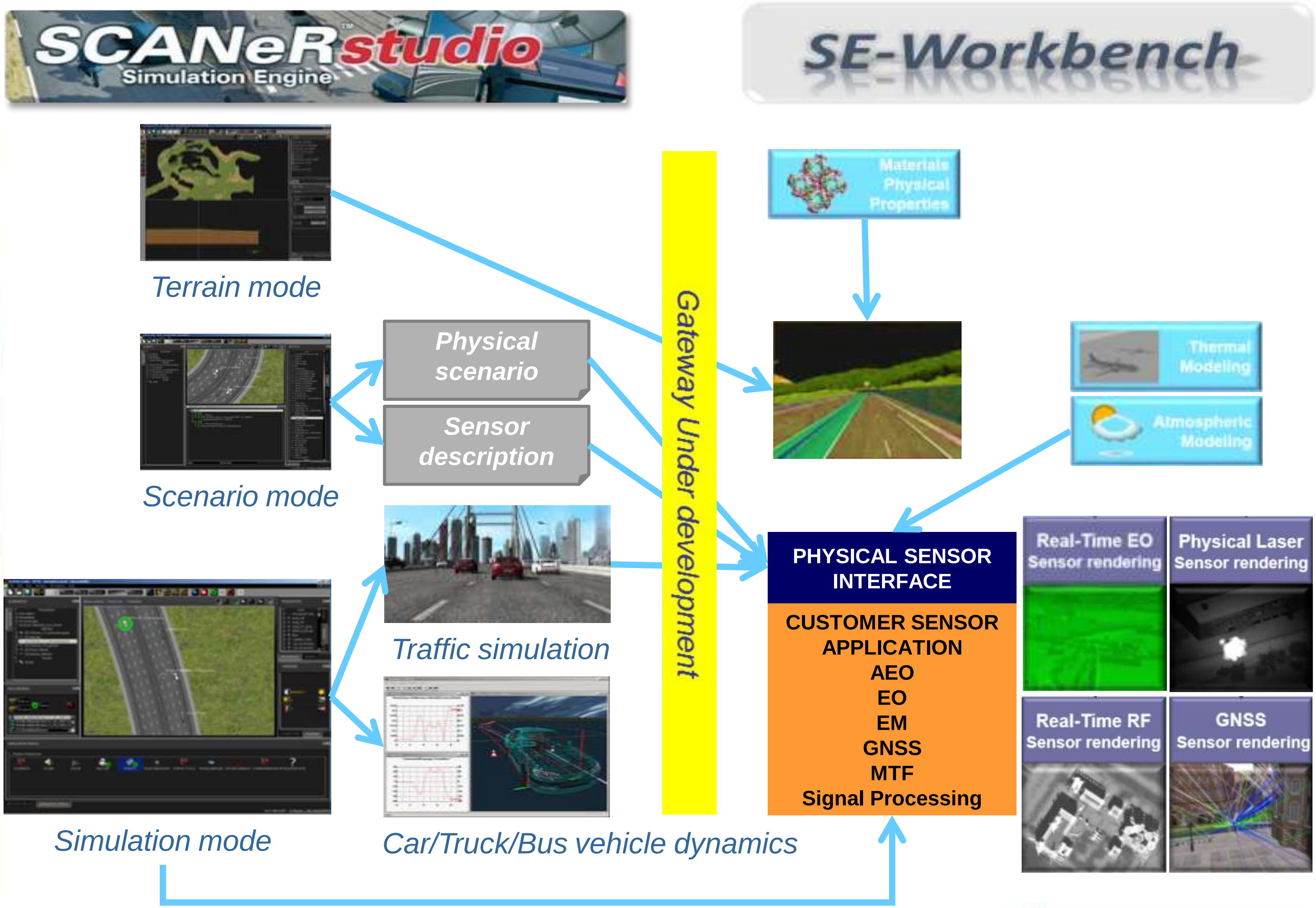
AVS: OKTAL-SE sister company for ADAS

Autonomous Vehicle Simulation company (July 2017):
Simulation for Advanced Driver Assistance Systems

Sogeclair Group



OKTAL-SE: a nice opportunity for SE-WB



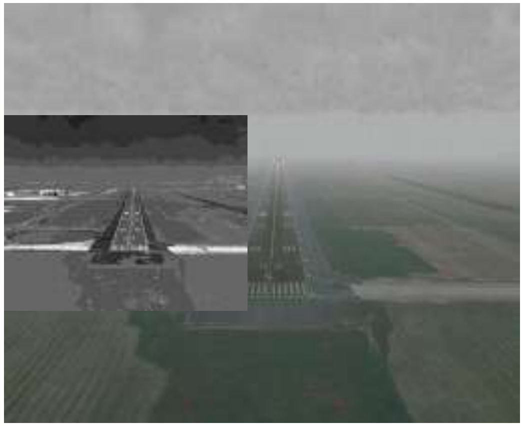
OKTAL Synthetic Environment

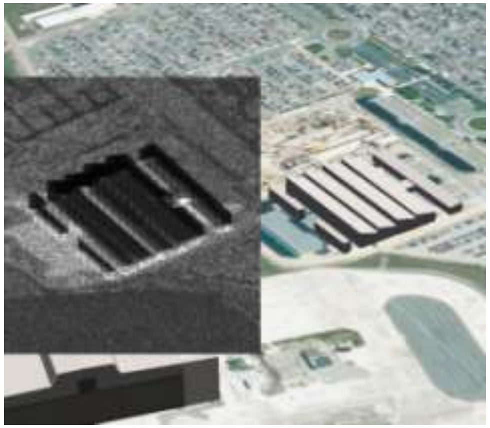
Our mission:

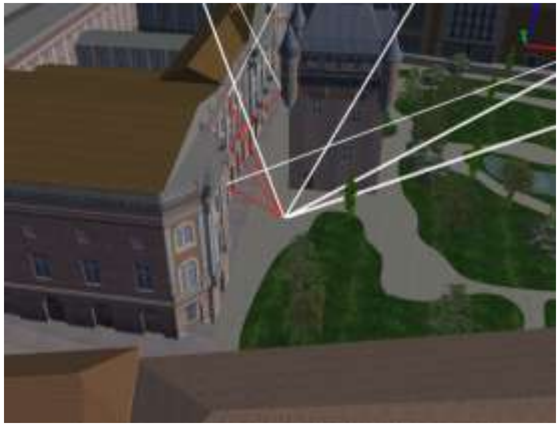
To provide COTS software for **physics based sensor simulation** in Visible, Infrared, Radar and GNSS fields.

Our goal:

To be leader within our **niche** market.







What for ?

User applications

Product lines

Simulation For Research

- IR/RF missile tracker assessment
- Enhanced Vision System (IR or radar)
- HardWare In the Loop simulation
- GNSS (GPS, Galileo,…) System stimulation

High Fidelity Workbench

Sharing

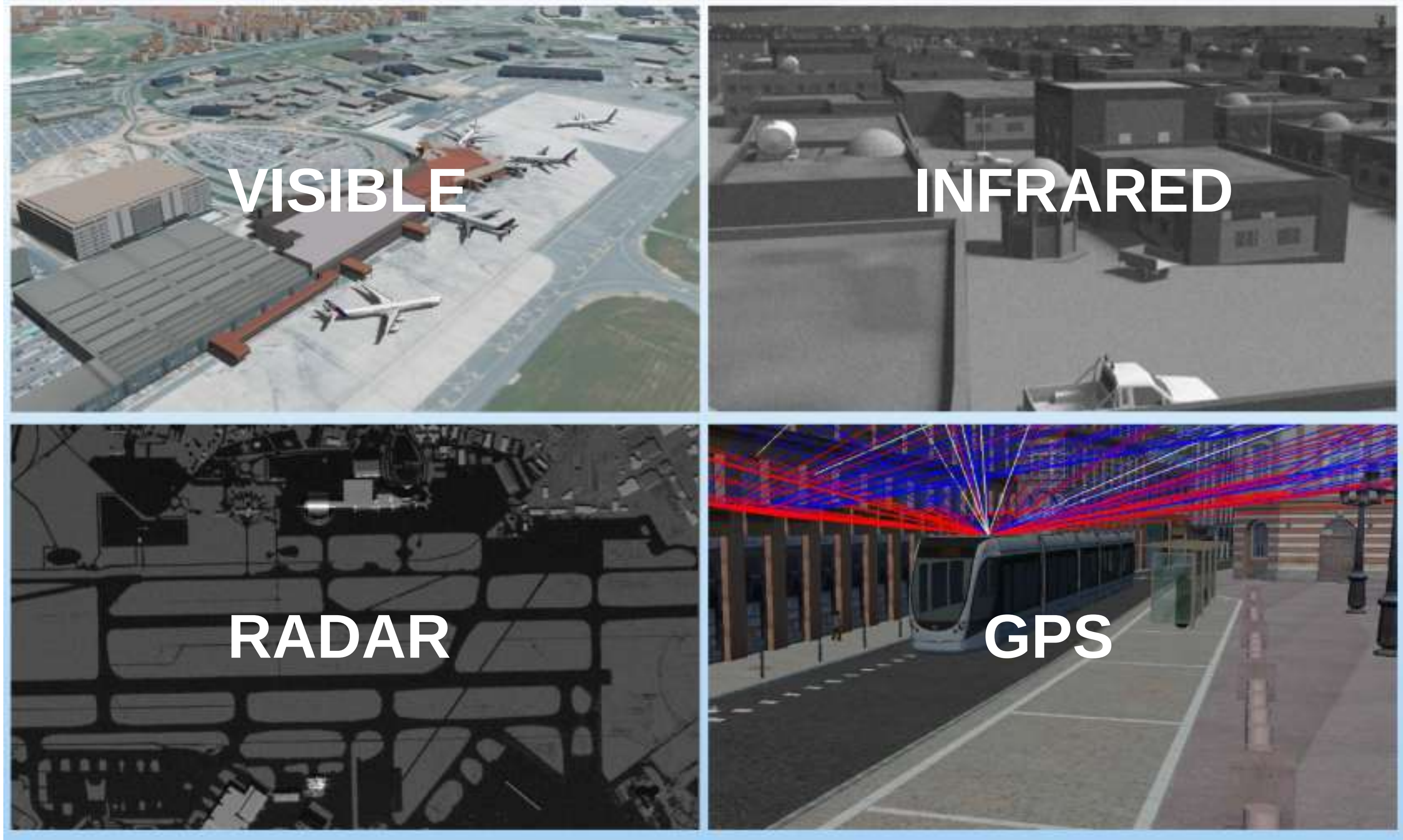
Science - Experience & Data

Simulation With Man in the loop

- Training simulation
- All weather conditions piloting
- UAV control station
- War & serious games …

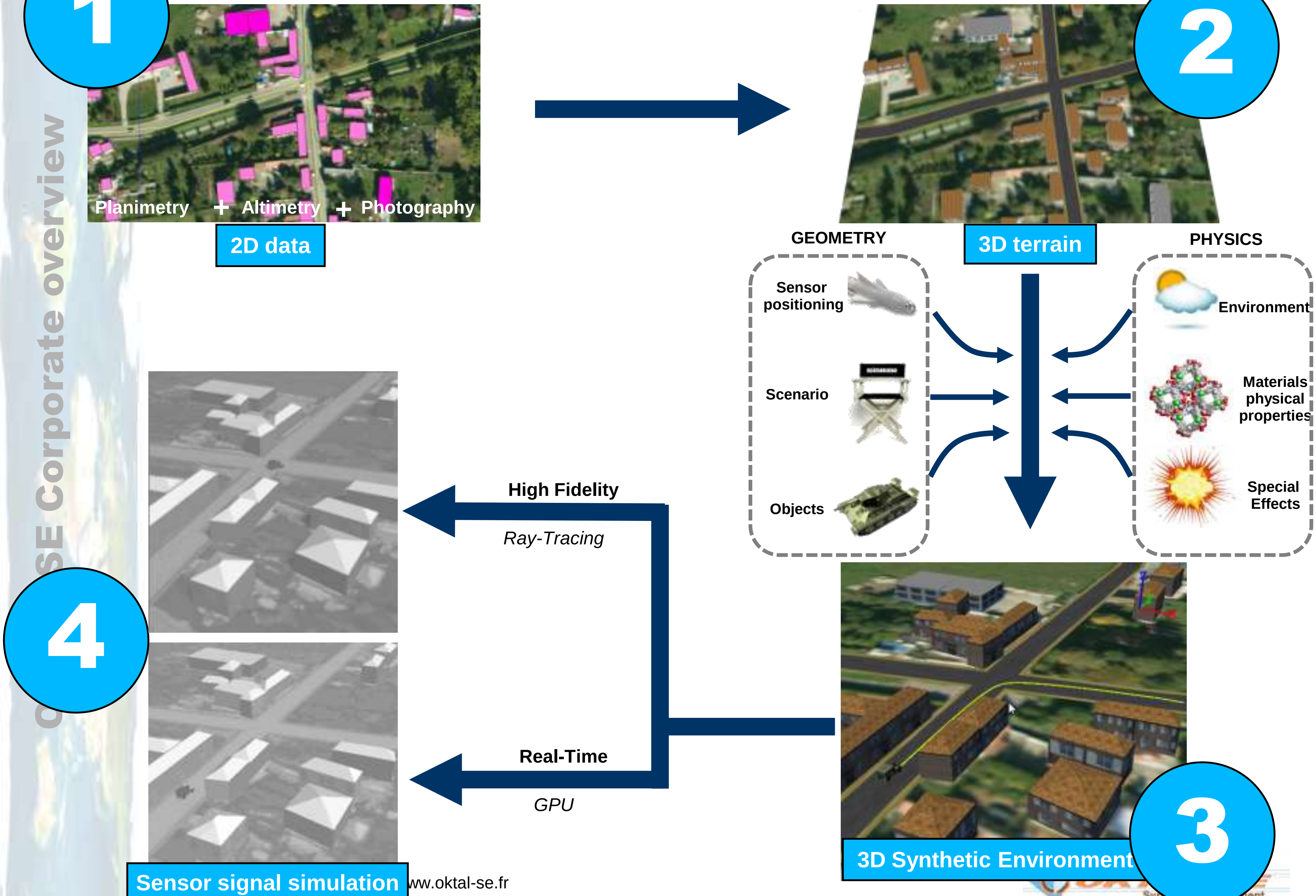
Fast Image Generator

4 domains & a unique SE

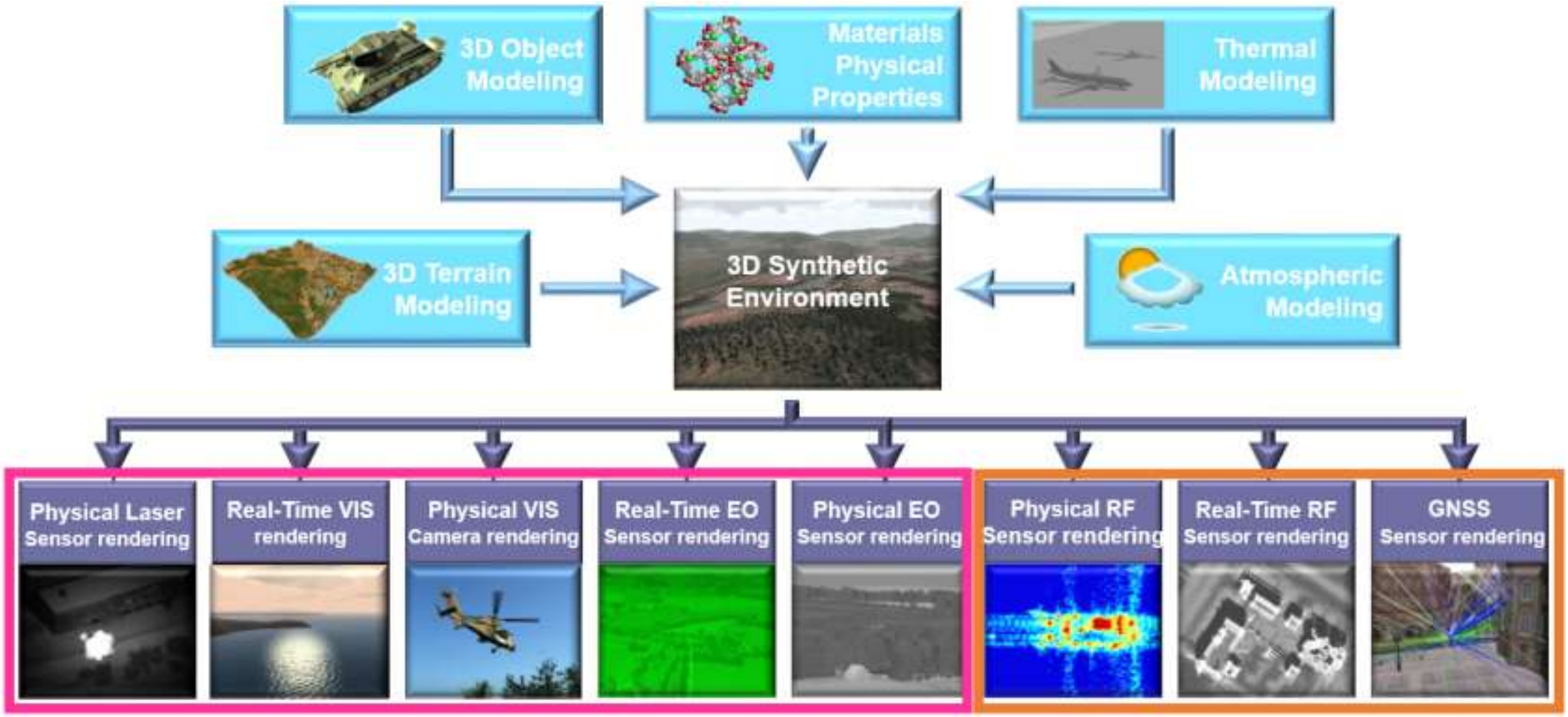


OKTAL-SE
Synthetic Environment

Simulation process



The offer structure: SE-Workbench



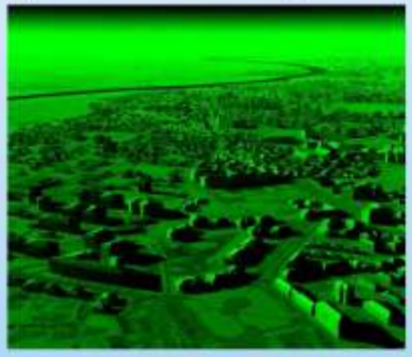
1) Multi Physics: Common Synthetic Environment for EO and RF

2) Accuracy/Speed duality: 2 ways to compute sensor signal on the same SE:
- ***slowly but precisely (non real time)***
- ***rapidly but with simplification (rapidly)***

SE-Workbench packaging

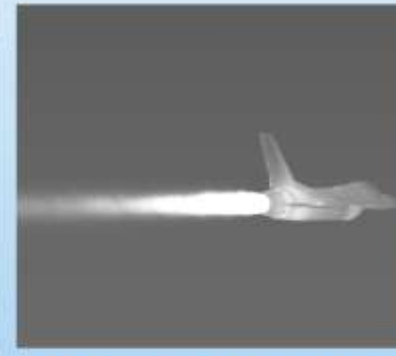
Several packages are proposed to cover general of specific applications:

SE-WORKBENCH-EO
Spectral visible image

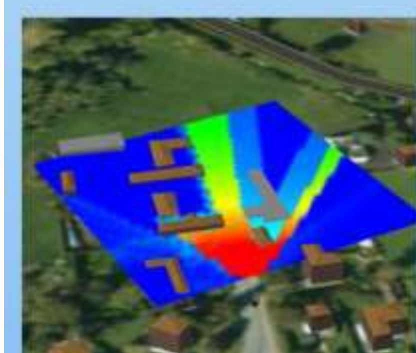


SE-WORKBENCH-EO
Infrared sensor simulation

SE-WORKBENCH-AEO
Active EO simulation

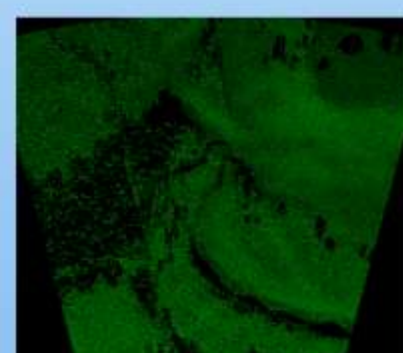


SE-WORKBENCH-EOS
Infrared signature of aircraft



SE-WORKBENCH-RF
1GHz-100GHz RF signal propagation

SE-WORKBENCH-SAR
Synthetic Aperture Radar (SAR)



SE-WORKBENCH-RBGM
Real Beam Ground Mapping radar

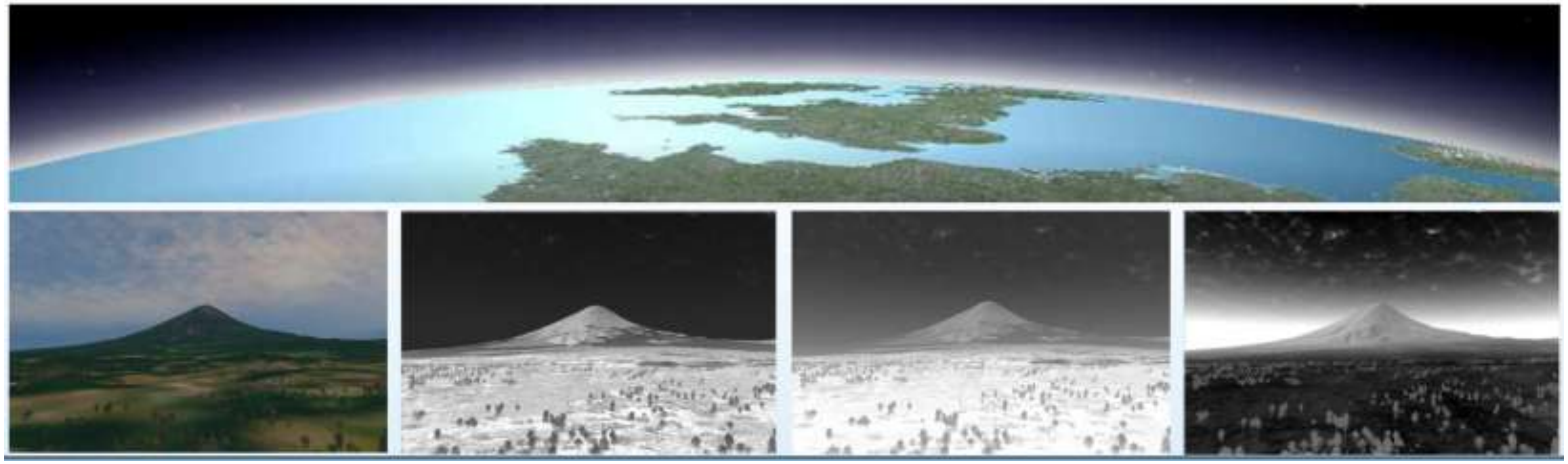
SE-WORKBENCH-GNSS
Reception assessment in urban

OKTAL-SE
Synthetic Environment

SE-Workbench: the new WTS tool

3D Globe Viewer with spectral infrared realtime rendering:

- Source 2D database = refined landcover
- 3D database = built in real time (procedural rendering)



World class customers

1. Civilian and defence industries that integrate our solutions in complex system with strong technical added value:

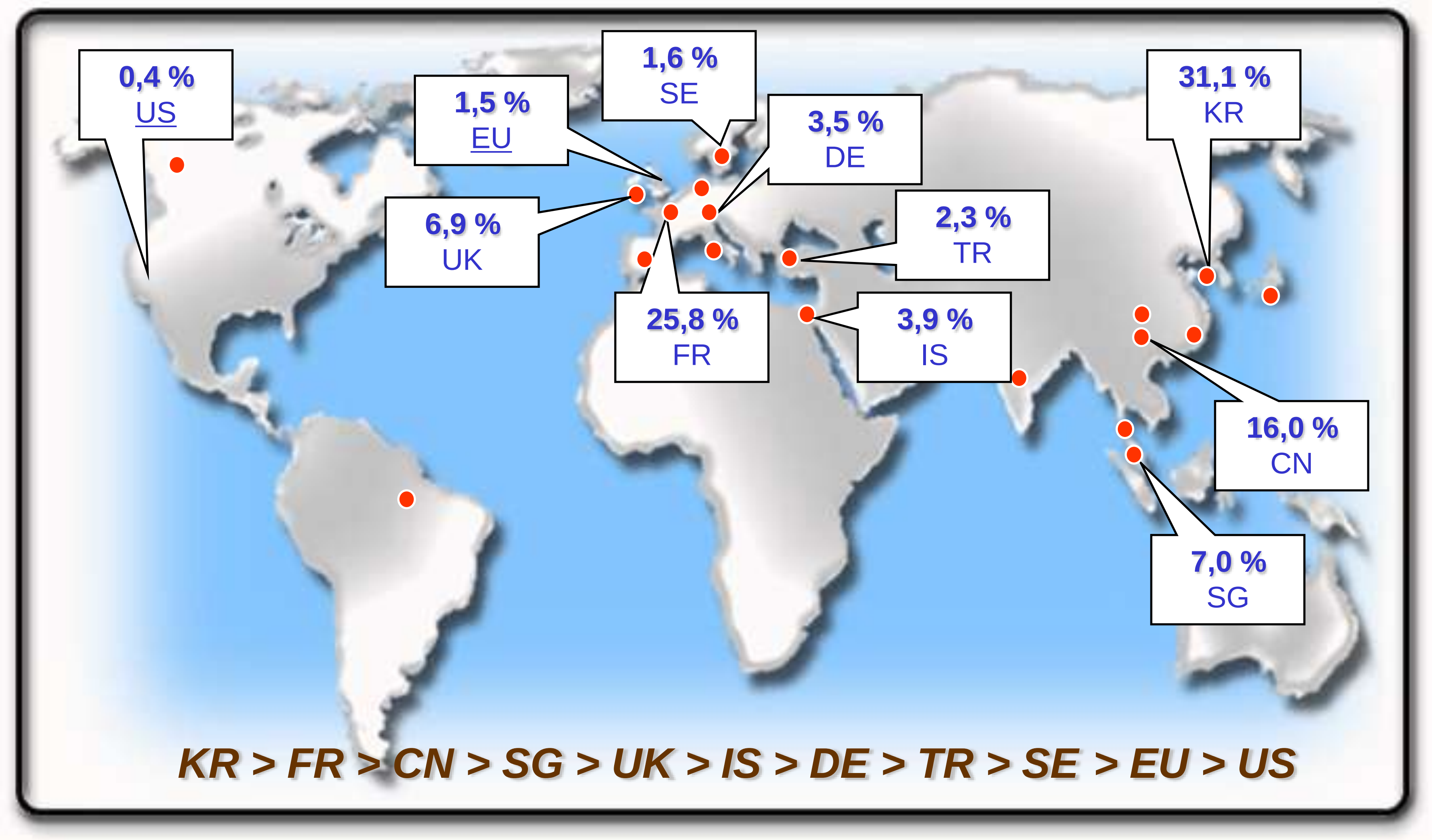
- MBDA FR / UK
- Dassault Aviation
- THALES
- SAFRAN / SAGEM
- AIRBUS Defence & Space
- ROKETSAN
- Diehl-BGT
- AIRBUS
- AIRBUS Helicopter
- LIG Nex1
- Hang Yu Communications
- Orange Labs
- AVIC
- Hanwha Thales
- RAFAEL

2. French or foreign MODs through their technical expertise centres and their program services:

- DGA/ Management Units
- BWB / WTD81 Germany
- FOI Sweden
- ADD South Korea
- DSO Singapore
- DSTA Singapore

SE-Workbench in the world

2013-14-15-16-17 average SE-WB orders (COTS + MT + Form)



Physical simulation success stories

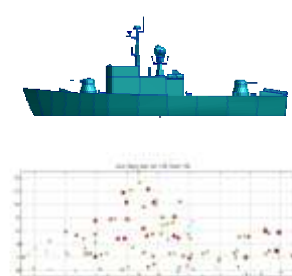
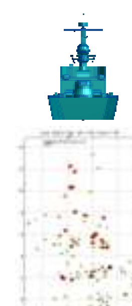
They make use of the SE-Workbench for development and validation purpose:

- **MBDA for the SCALP** (Storm Shadow) missile (**EO**)
- **MBDA UK** radar on missile program
- **SAGEM for the AASM** missile (**EO**)
- **MBDA for the ANL** (FASGW) missile (**EO**)
- **French DGA** for the assessment of surveillance radar interference due to the blades of wind power plant (**RF**)
- **The French DGA** as a reference tool in **EO** domain
- **AIRBUS Helicopter** for the Tiger Rotorcraft painting characteristics assessment both in visible and Infrared (**EO**)
- **EDA** for maritime environment Modelling & electromagnetic signature of surface targets (**RF**)
- **DIEHL-BGT** for missile (**EO + RF**)
- **ADD** for missile + UAV (**EO + RF**)
- **BWB** as a reference tool for **EO + RF**
- **DSO** as a reference tool for **RF**
- **FOI** as a reference tool for **EO + RF**
- **RAFAEL HWIL-EO and Active EO**
- **ROKETSAN HWIL EO** systems
- **TERMA** for new SAR concepts assessment





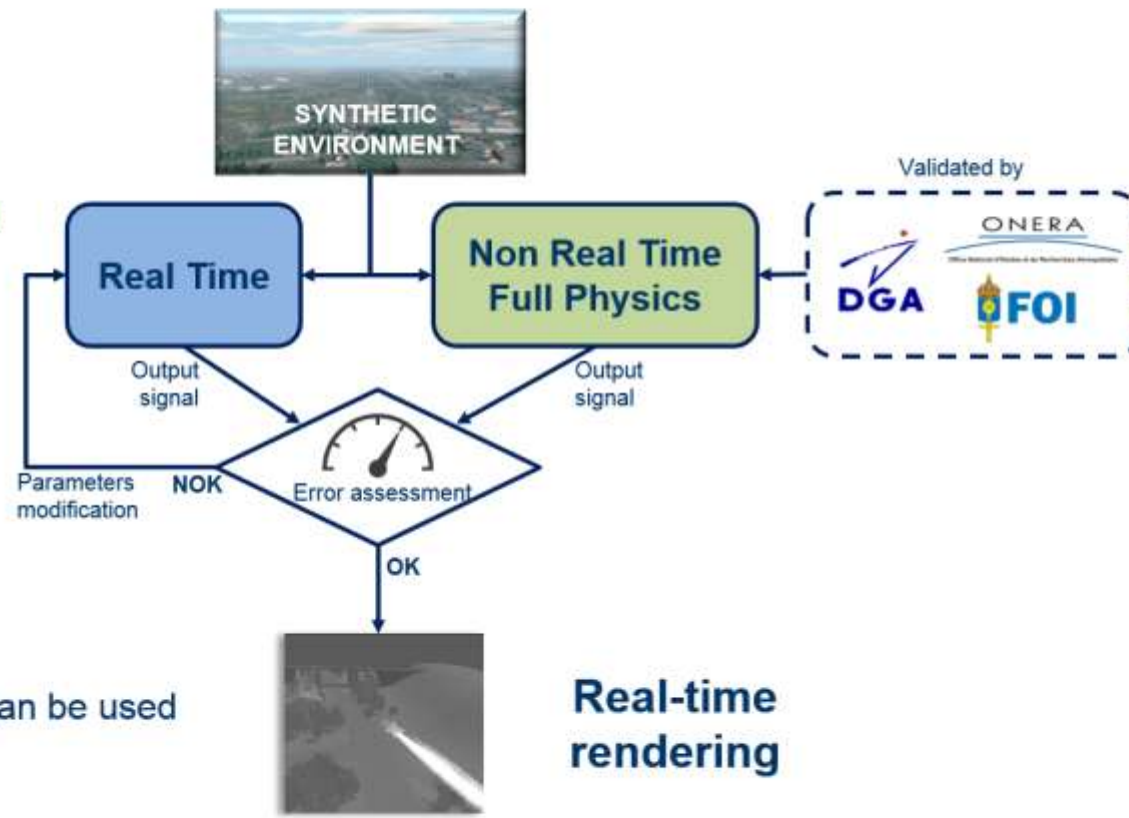


SE-WORKBENCH philosophy

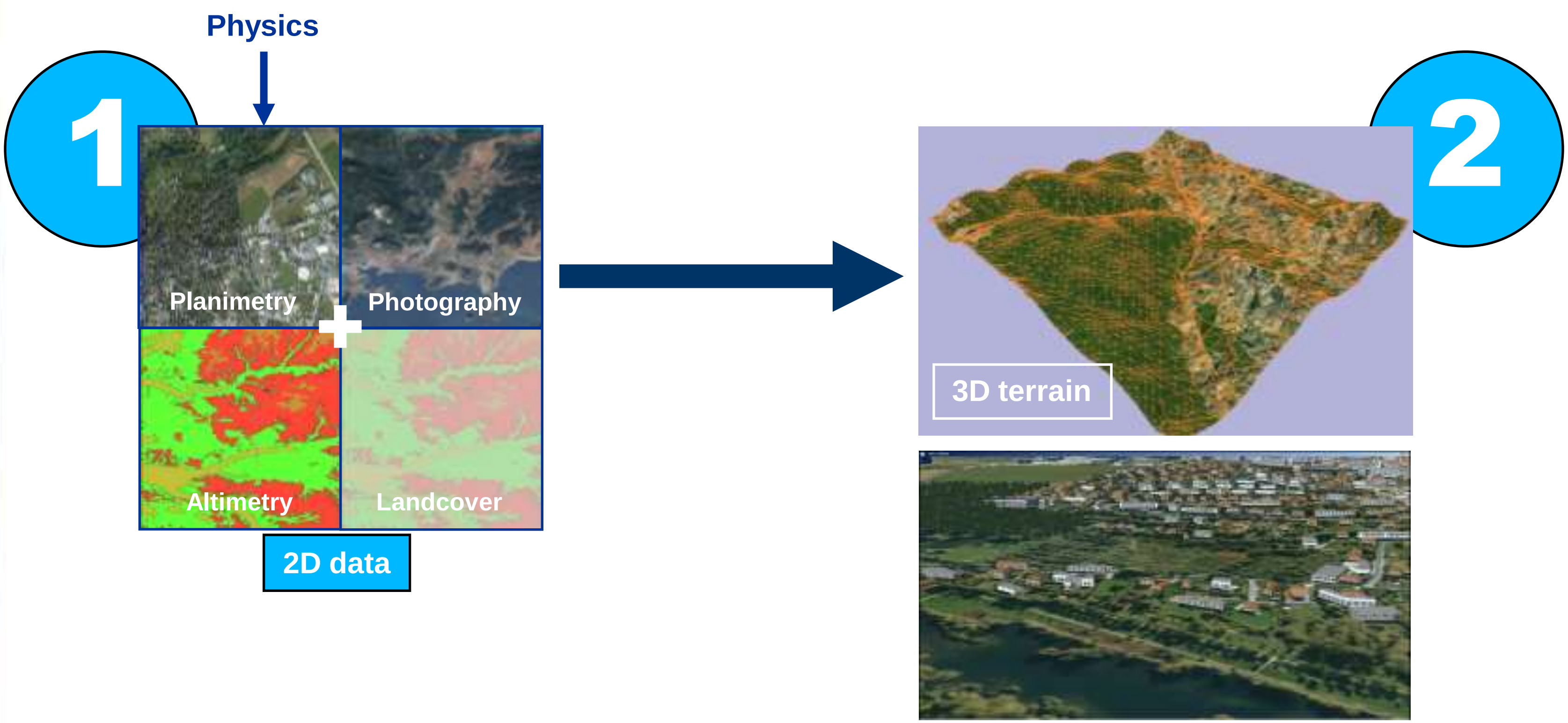
Real Time vs Non Real Time

1. Reference data using Non Real Time rendering
2. Calibration of the Real time rendering
3. The real-time rendering can be used for reliable simulation



SE-WORKBENCH: modeling tools

3D terrain modeling

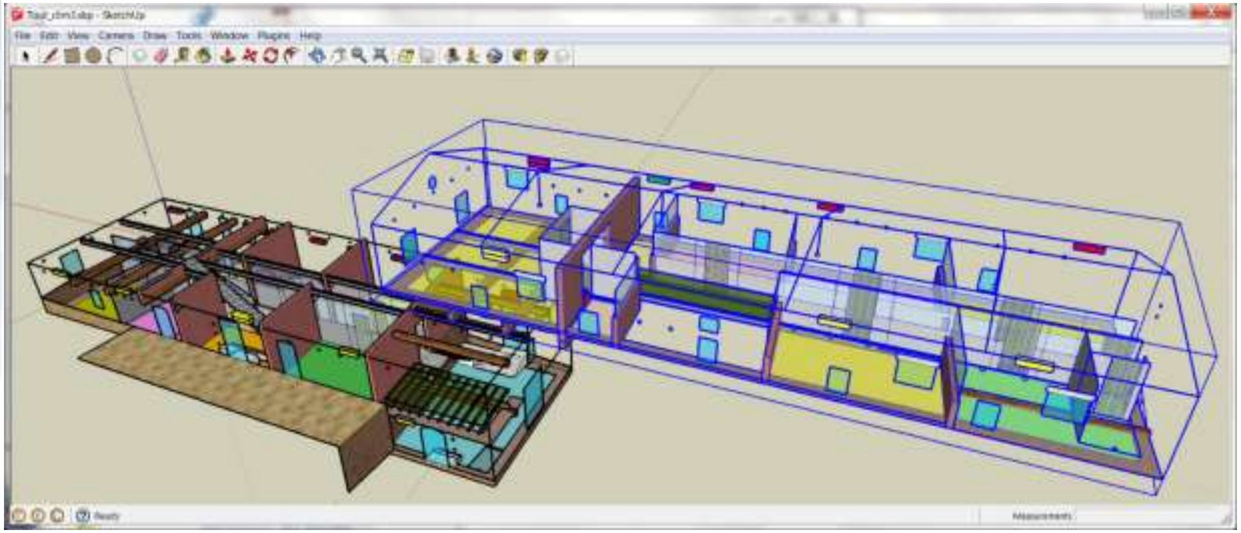


SE-WORKBENCH: modeling tools

Objects modeling:

1) ***Plugs-in***

2) ***Dedicated 3D modelling tools***

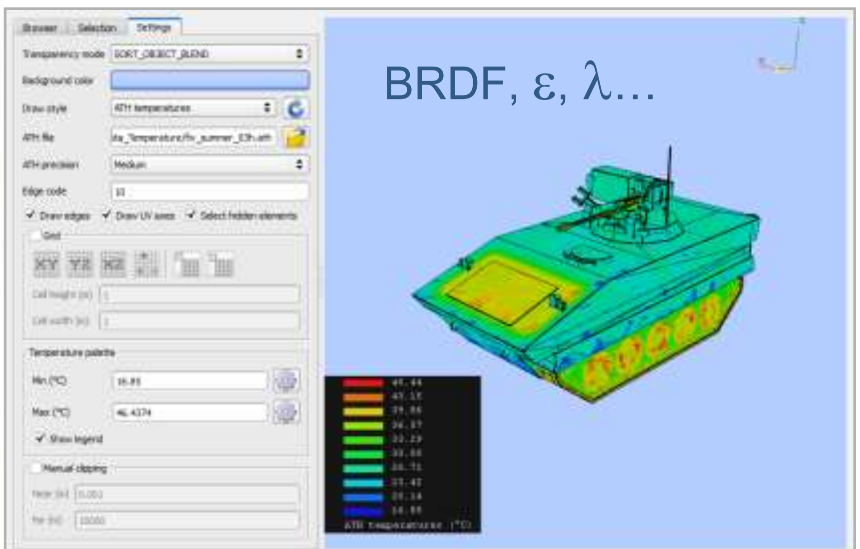


OKTAL-SE Synthetic Environment

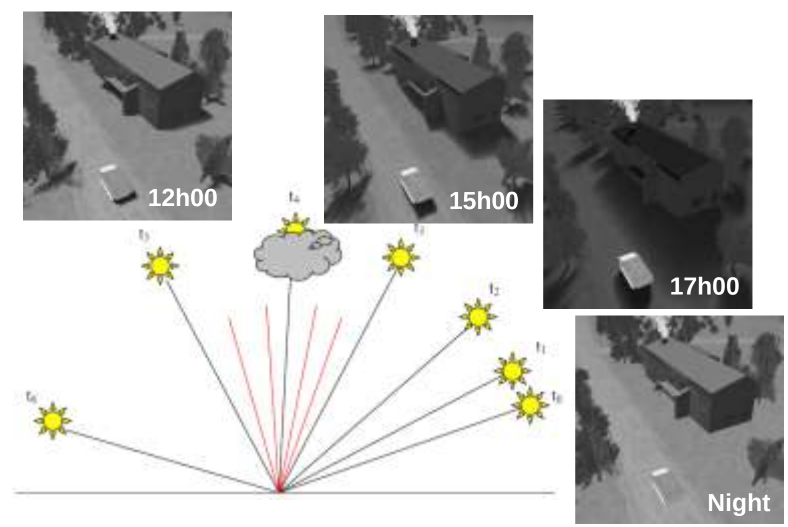
SE-WORKBENCH: modeling tools

Physical modeling:

1) *Materials*
2) *Thermics*
3) *Atmosphere*



Thermal shadows

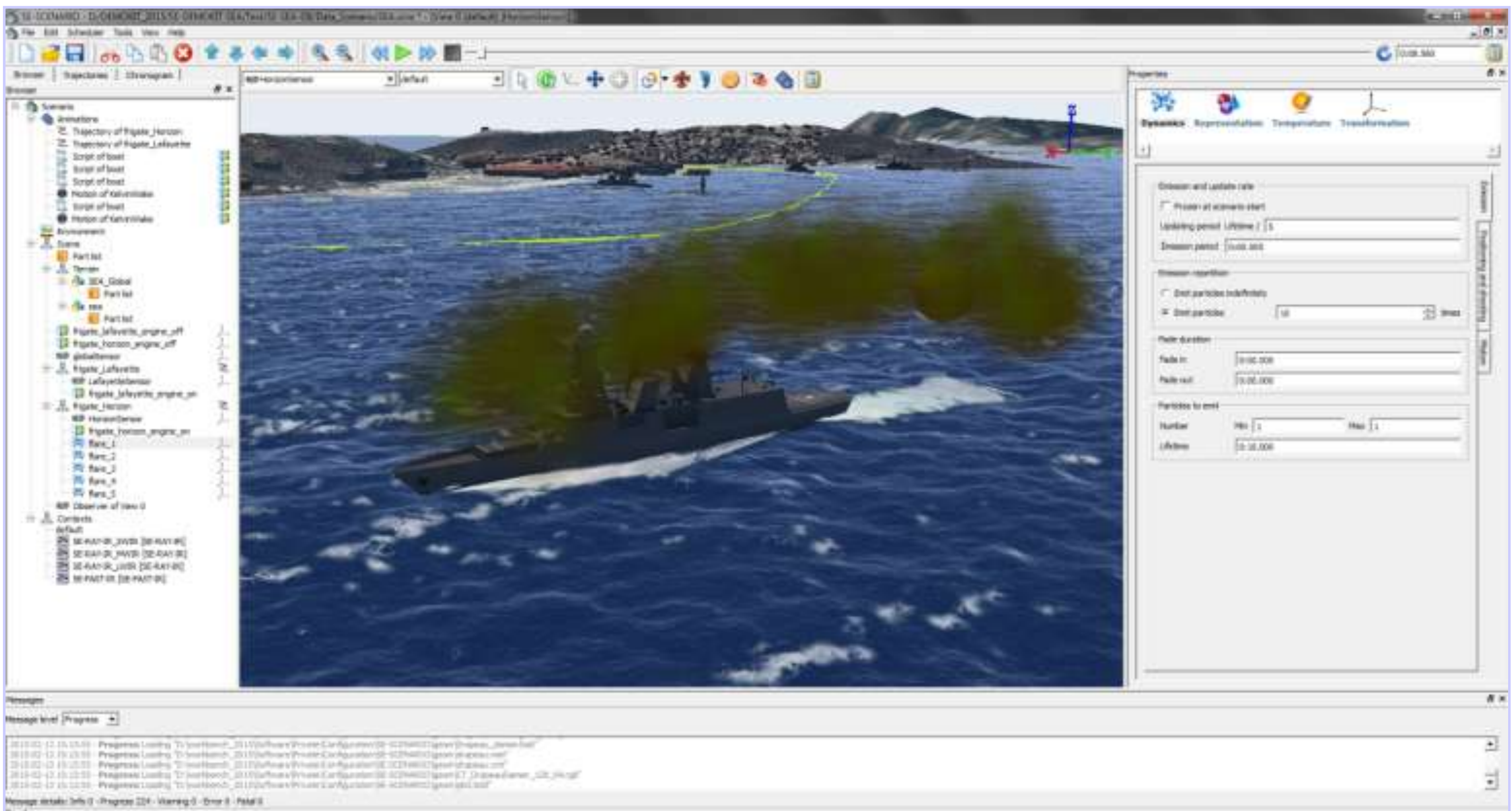


SE-WORKBENCH: scenario edition

Physical modeling:

- 3D database
- Atmospheric data
- Thermal data
- Objects, targets

Trajectories
Special effects (clouds, flares, particles systems, plumes, flares, sea…)
IR sensors
Radars emitters



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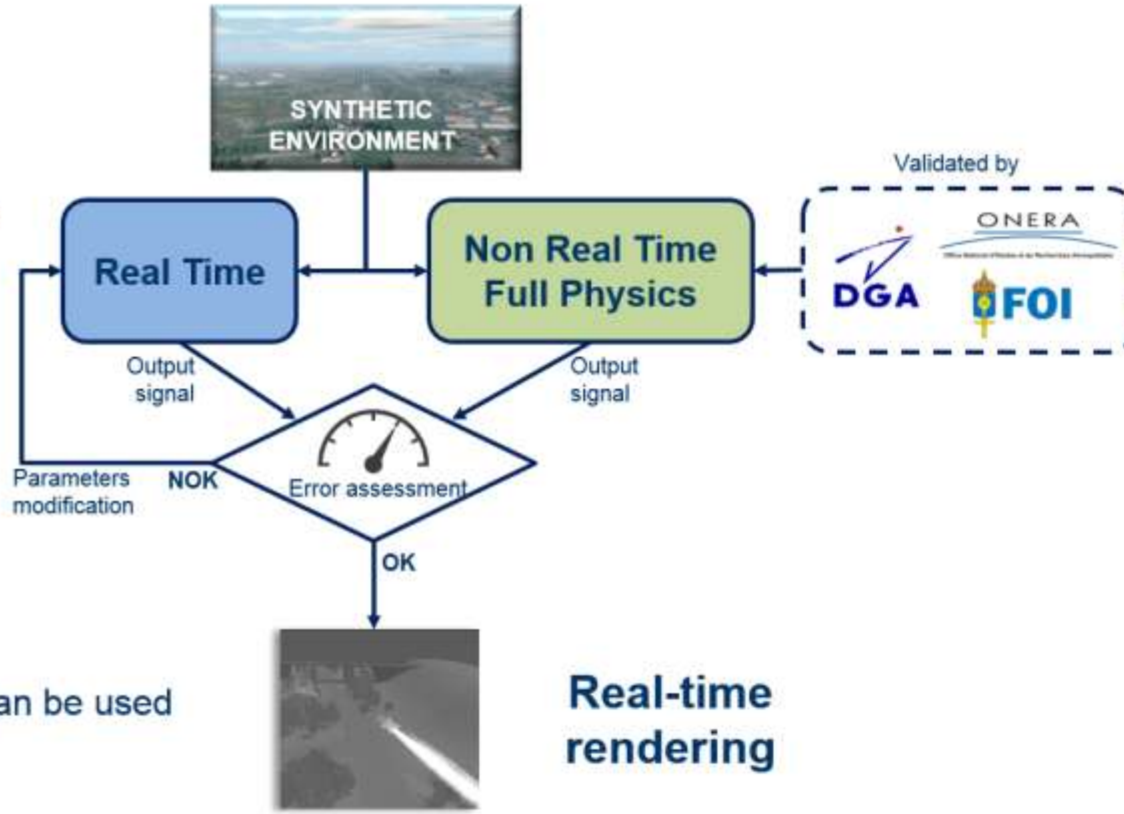
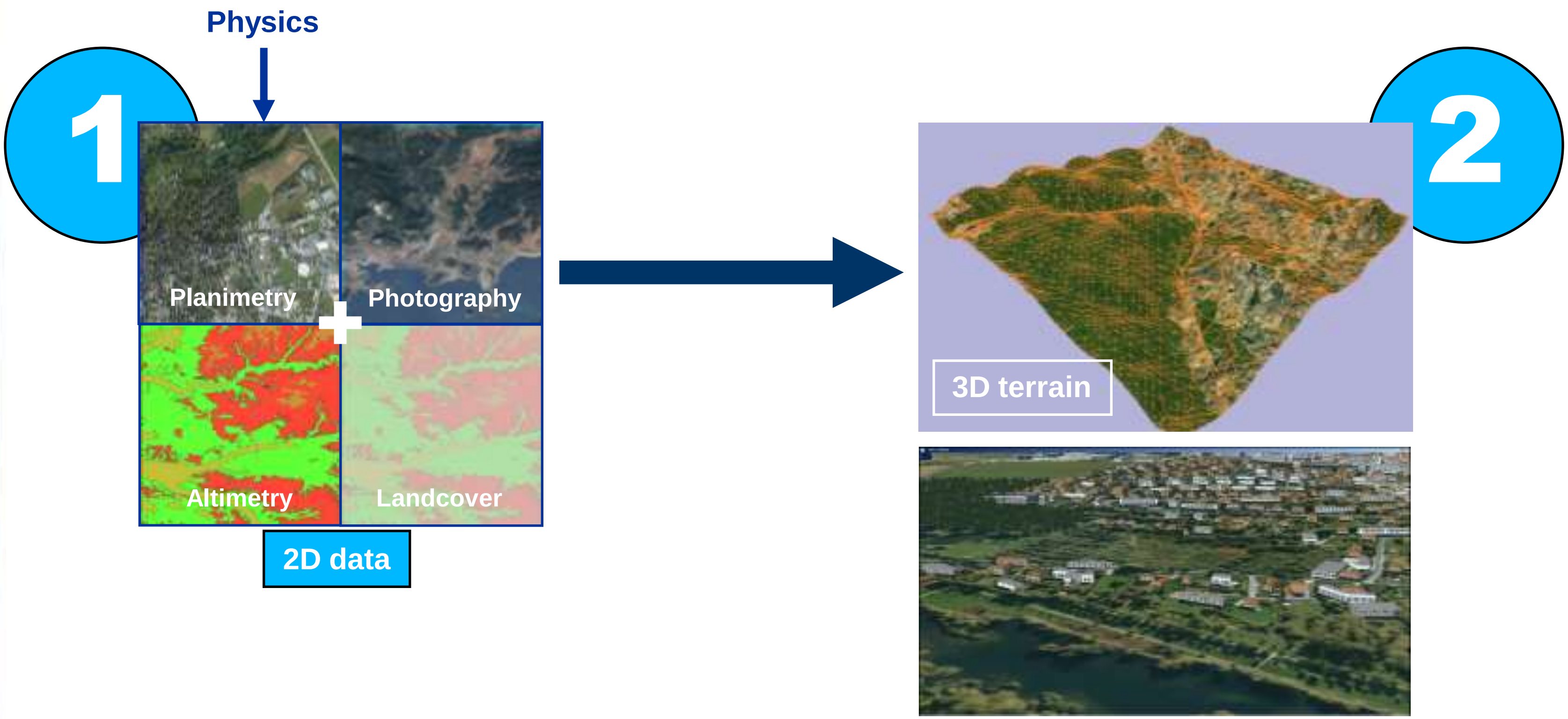


Real-time rendering

SE-WORKBENCH: modeling tools

3D terrain modeling



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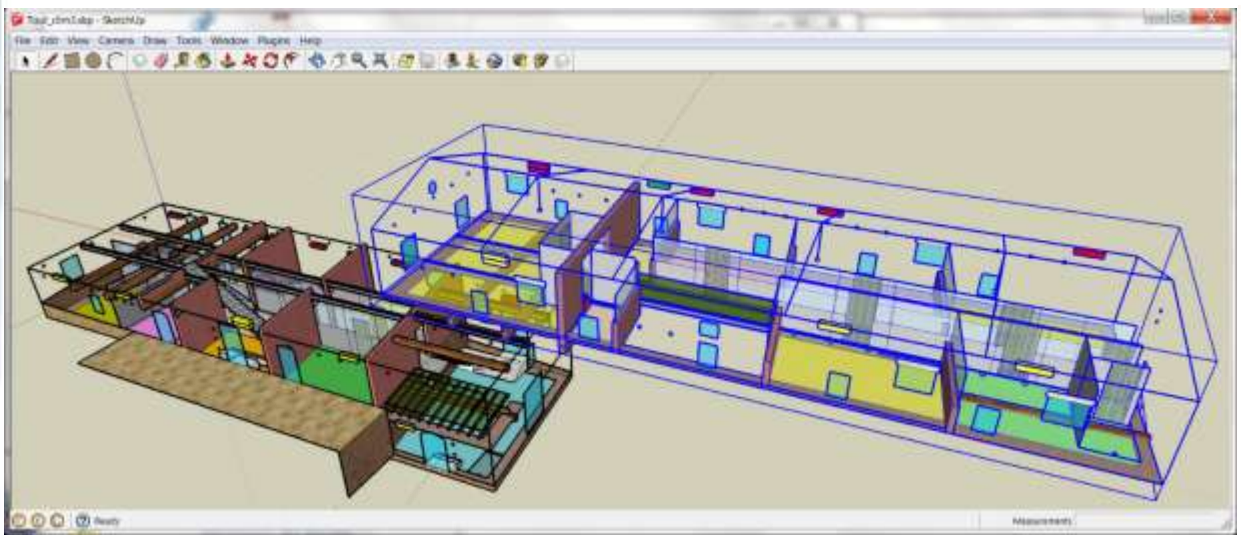

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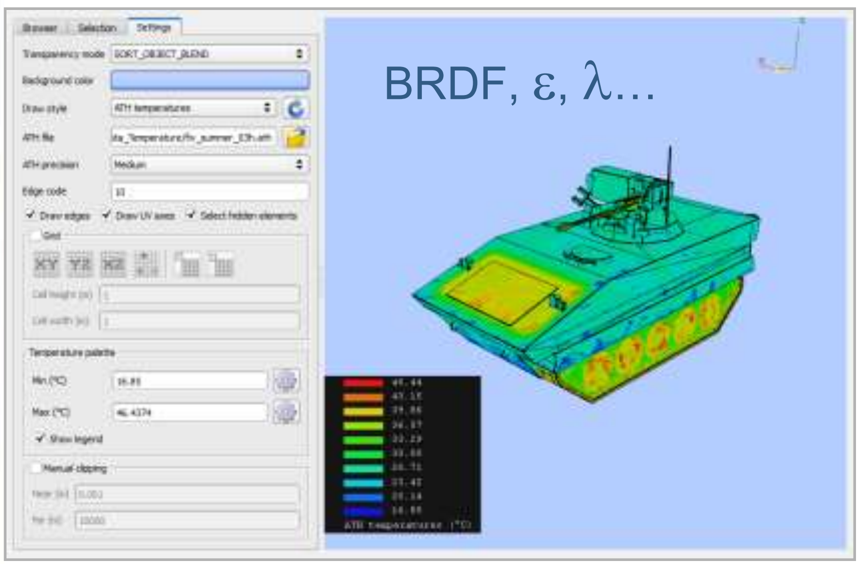

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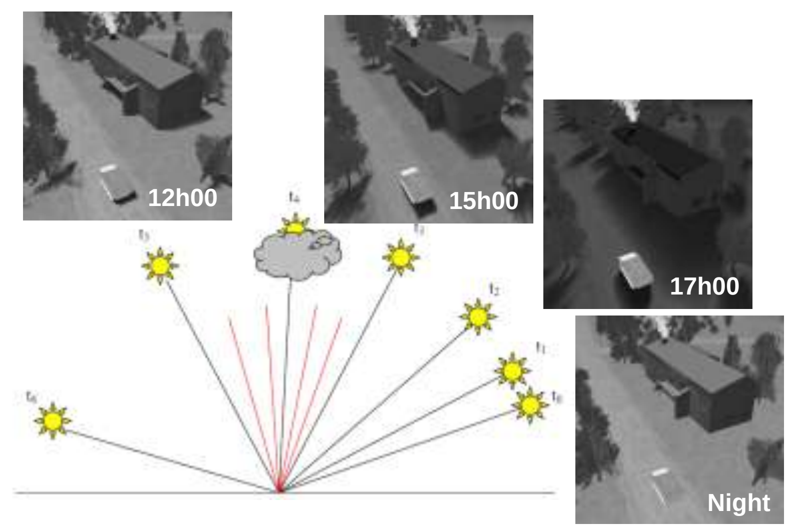

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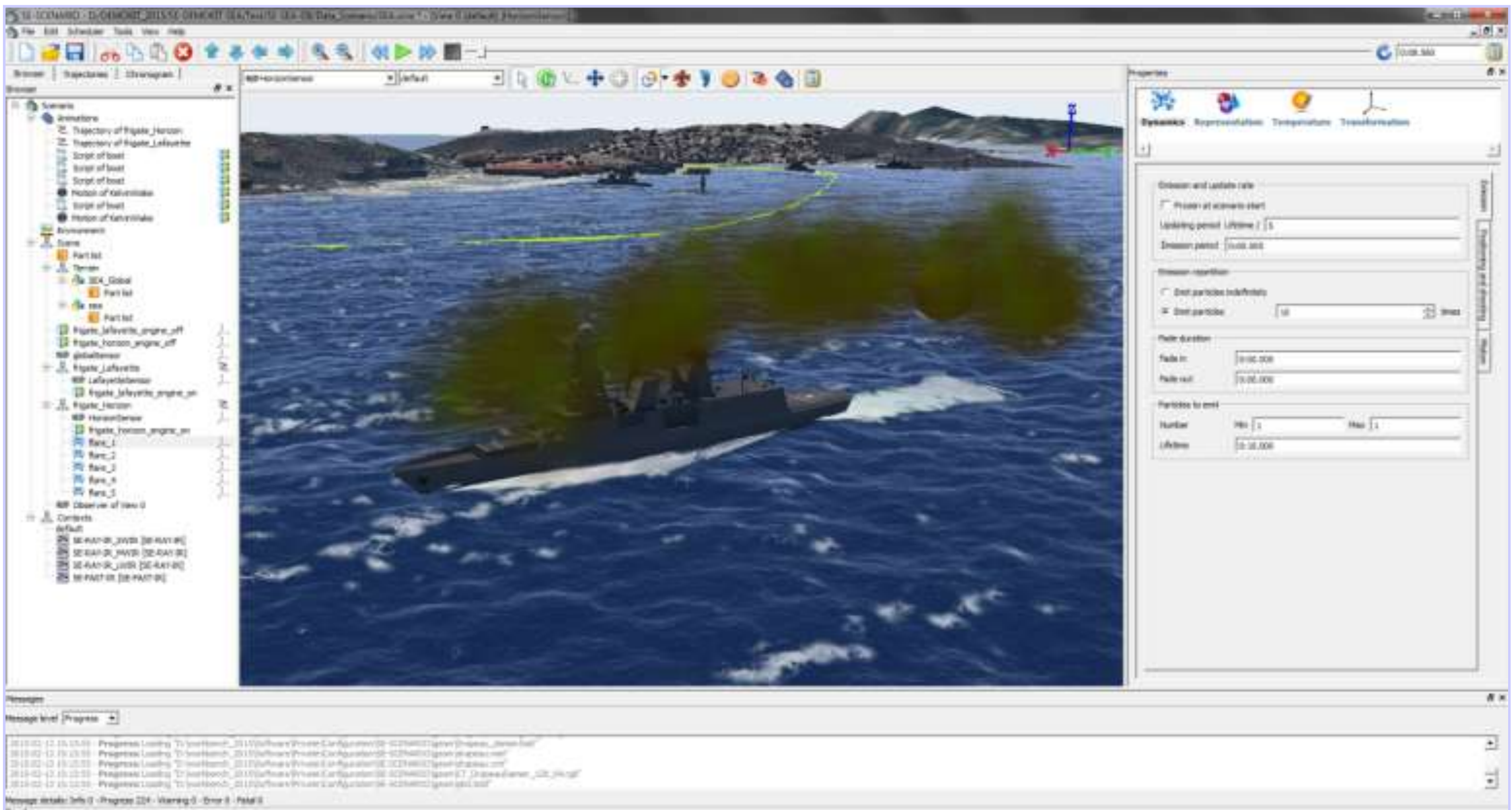
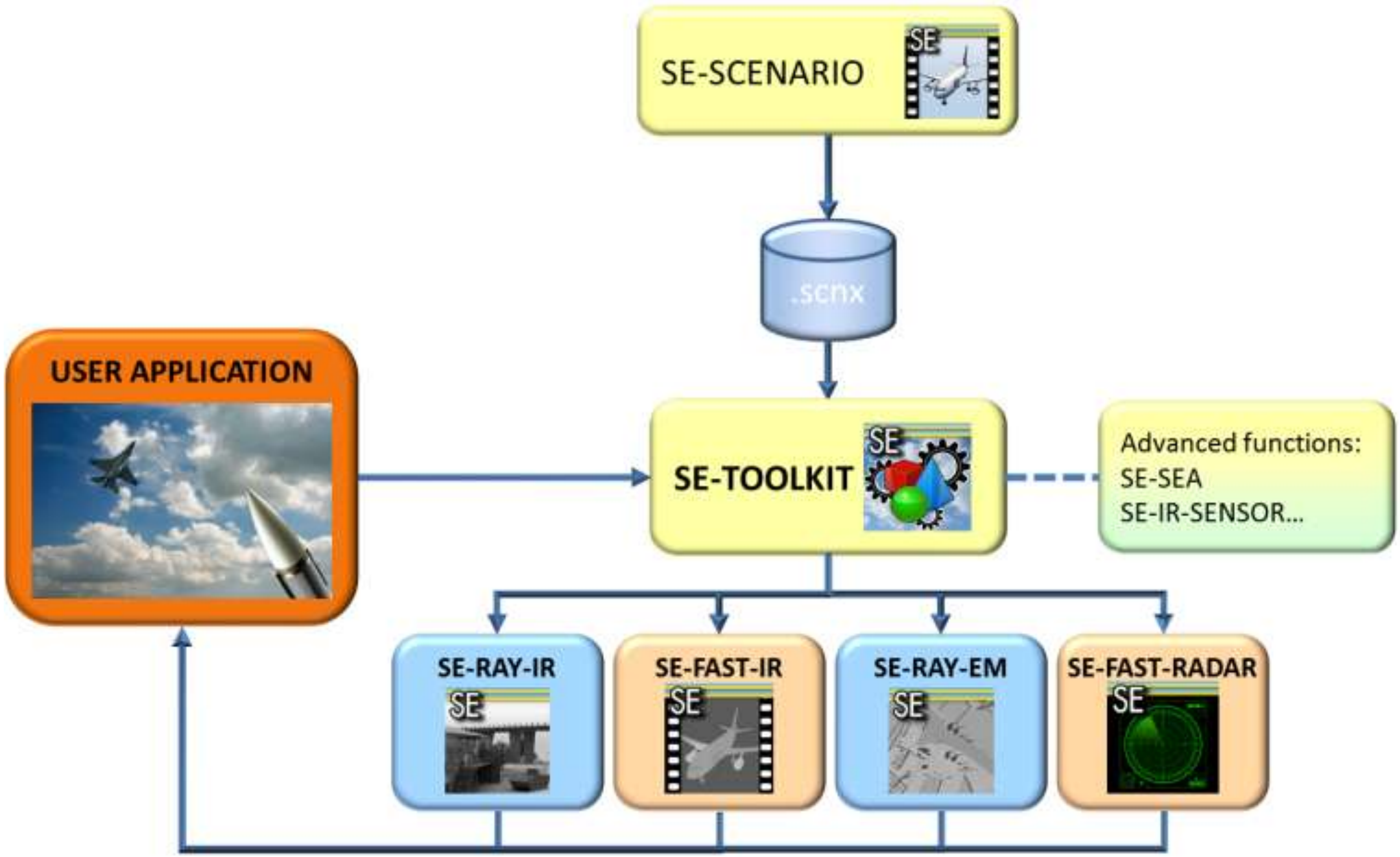
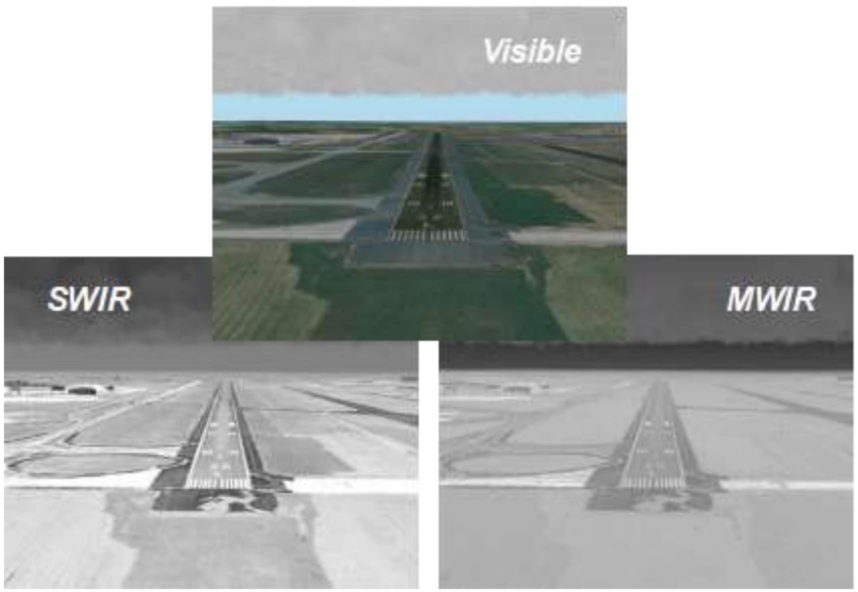


SE-WORKBENCH: GUI / Python / C API

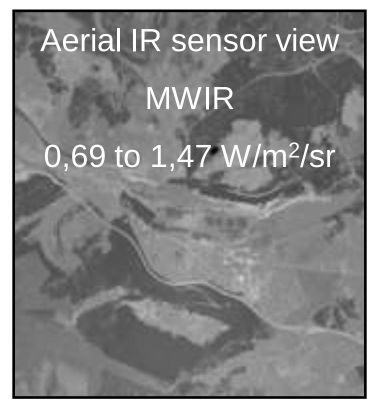


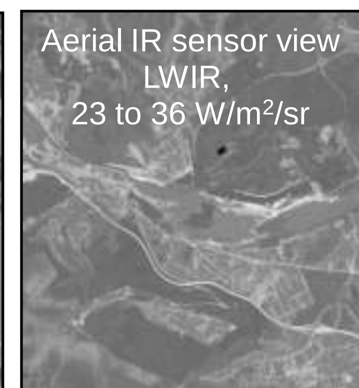
SE-WORKBENCH-EO

Real Time
GPU shaders + CUDA



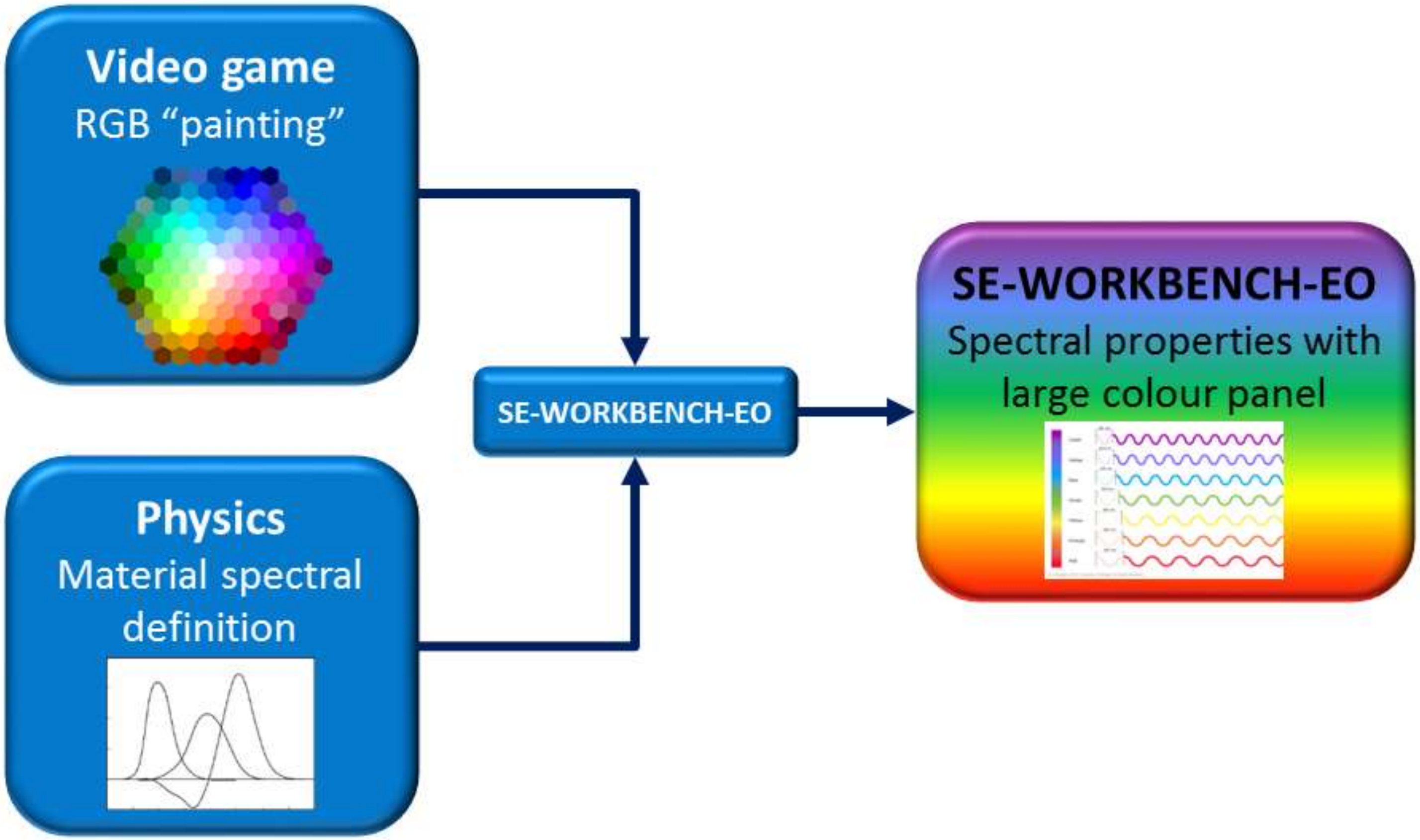
Non Real Time:
Ray Tracing





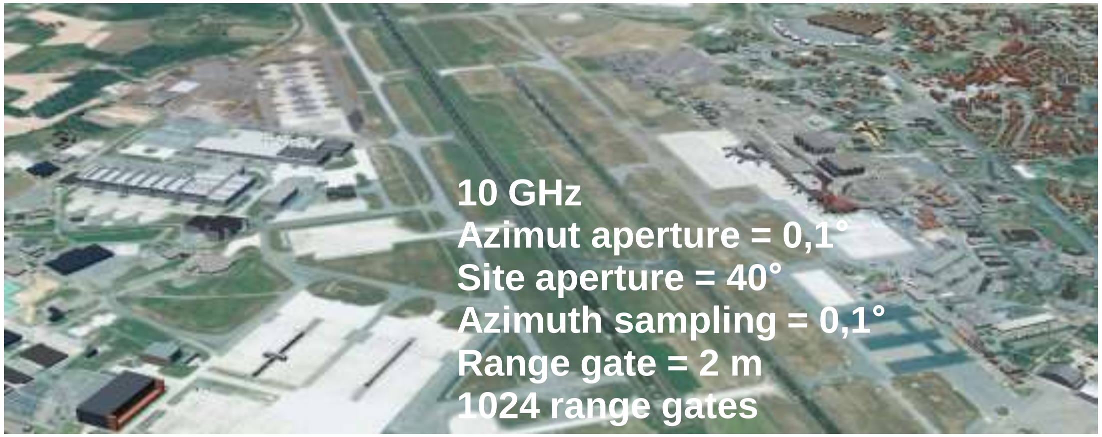
SE-WORKBENCH-EO/VC

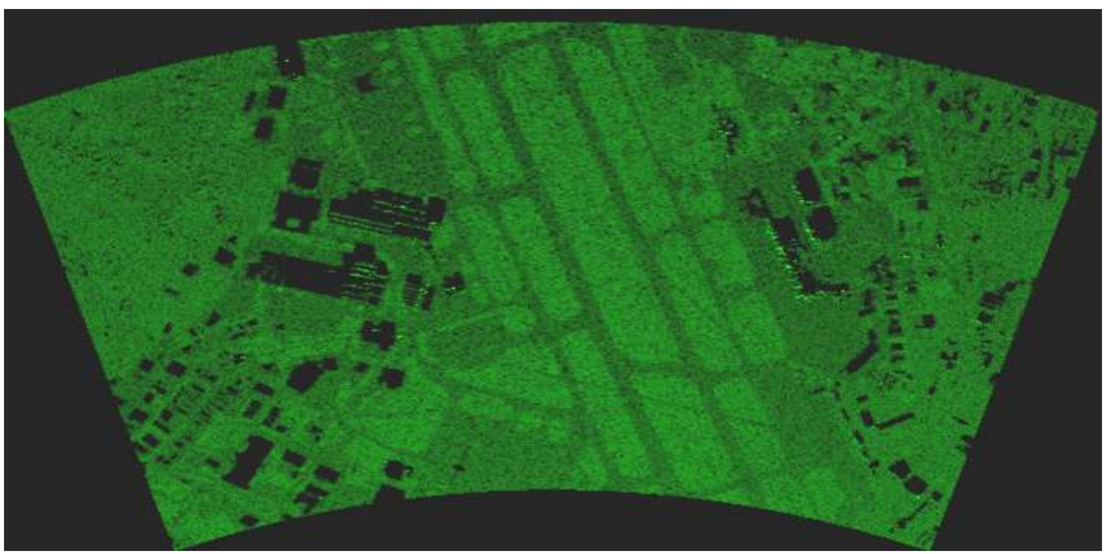
Spectral Visible Color capability



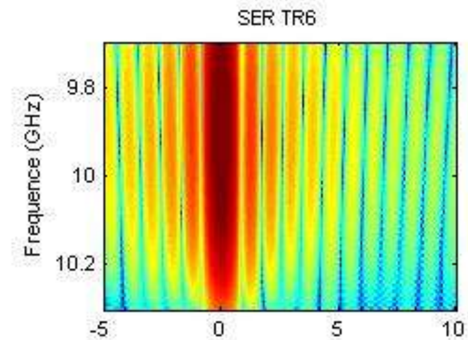
SE-WORKBENCH-RF

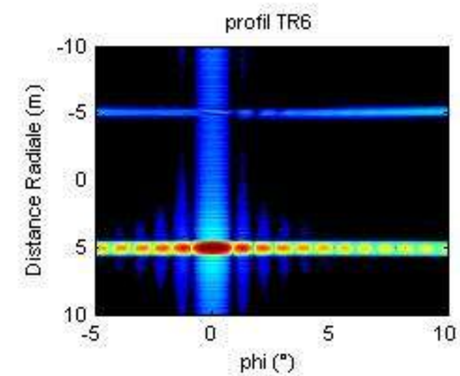
RBGM radar





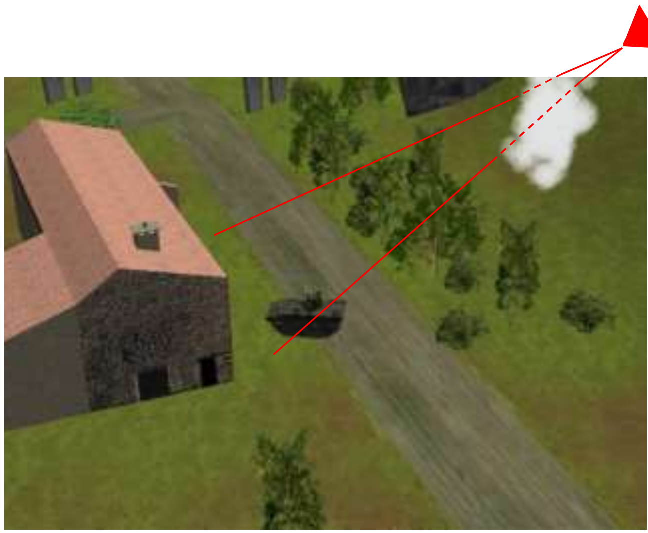
RCS ➔

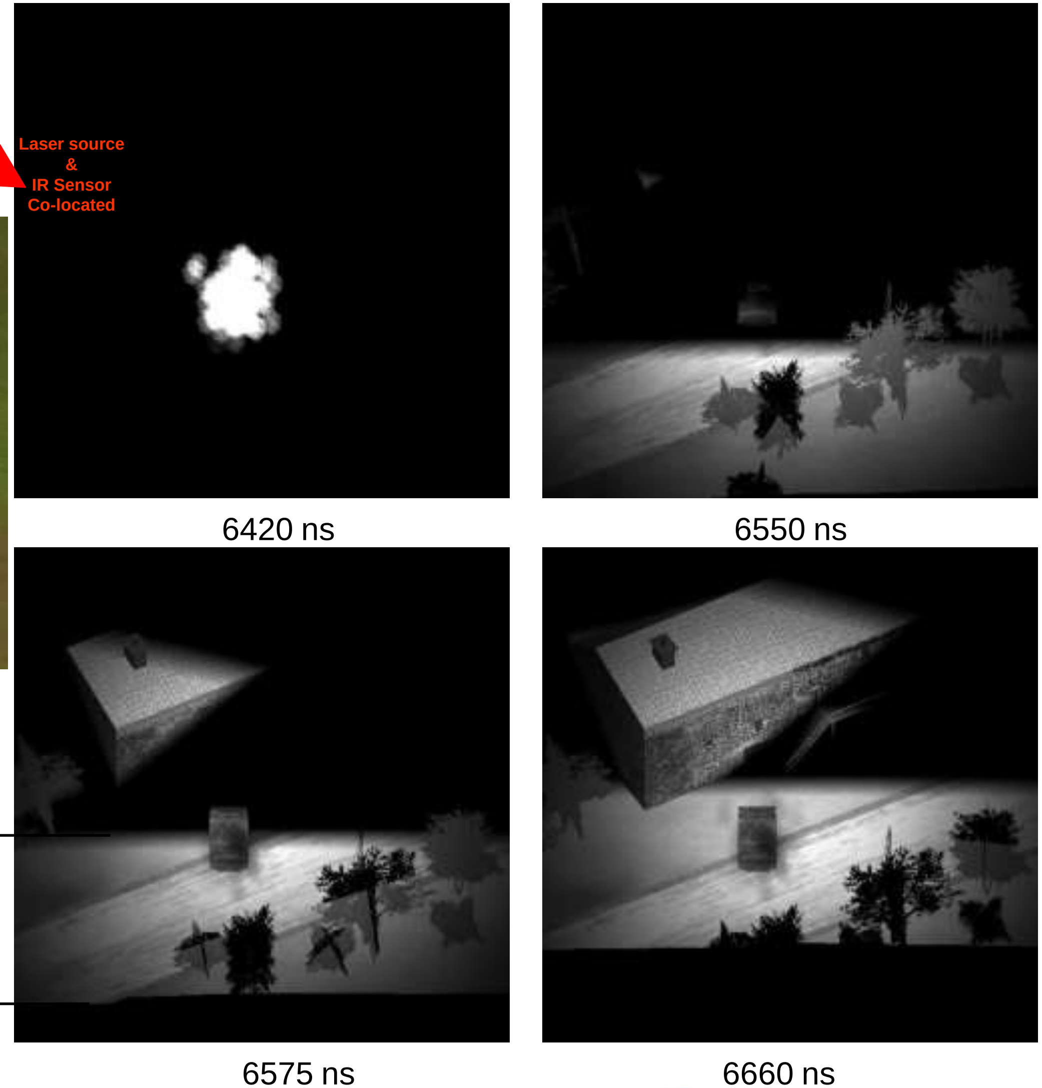


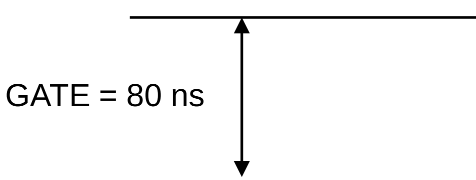


SE-WORKBENCH-AEO

Flash imagery
Pulsed LASER

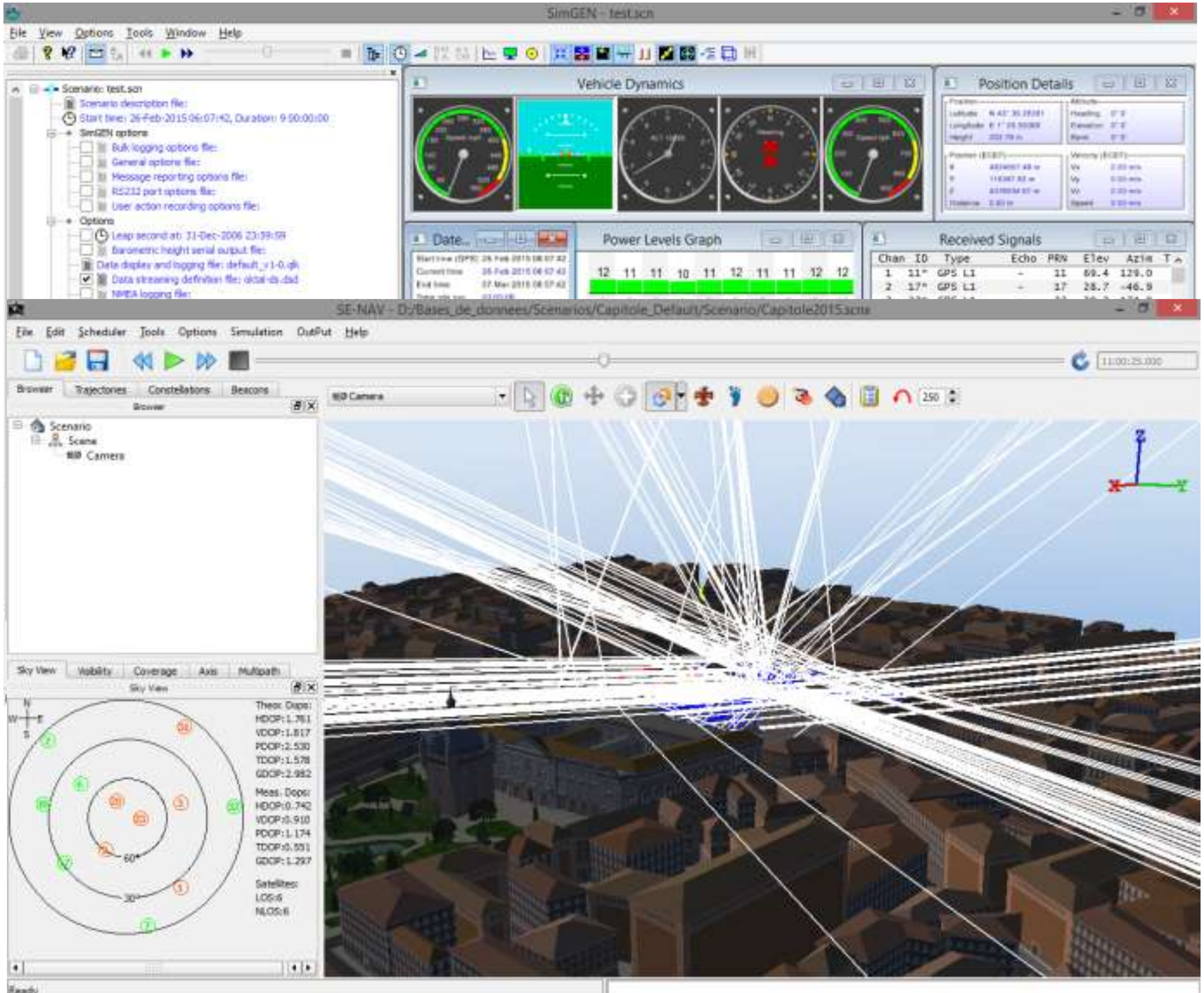






OKTAL-SE Synthetic Environment

SE-WORKBENCH-GNSS



SE-Workbench: new trend: Deep Learning

OKTAL-SE contribution: using the Synthetic Environment to enrich the source data set

Limitations of “standard approach” in Deep Learning process

Overfitting: due to limited size of training data sets to train an algorithm

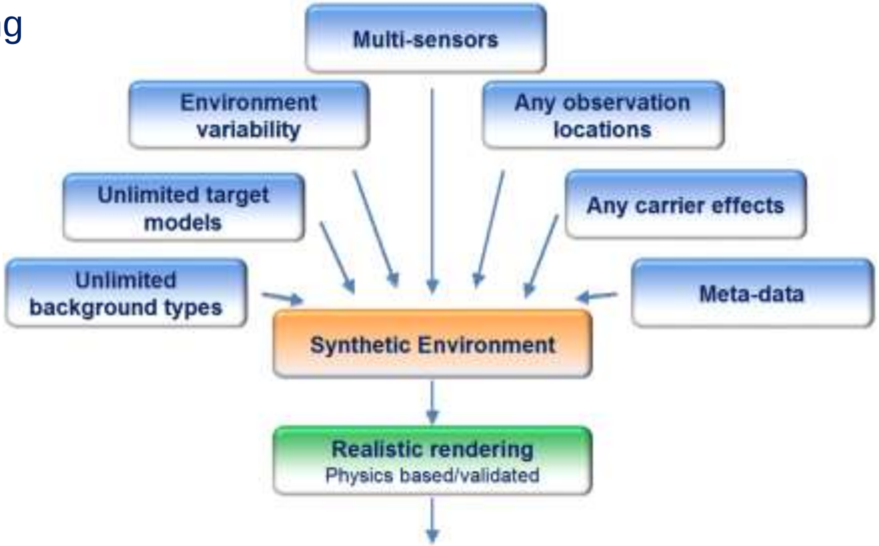
Unbalanced training data sets: lack of diversity

Observation locations: difficult to find real images of the same scene from different viewing angle

Multi-sensors: almost impossible to find same scene/time/orientation real images from EO/IR **and** RF sensors

Tagged images: meta data available via SE-Workbench: pixel distance, identification, contrast, shadows…

Repeatability: for Monte Carlo assessment



OKTAL-SE expectations with interoperability

Synthetic Environment Interchange needs:

At target data level ⇨ file conversion (OFLT...)
➲ SEDRIS

At source data level (at various levels of semantics) ⇨ file conversion (DTED, Shapefile...)
➲ SEDRIS

At terrain modeller work data level
➲ ?

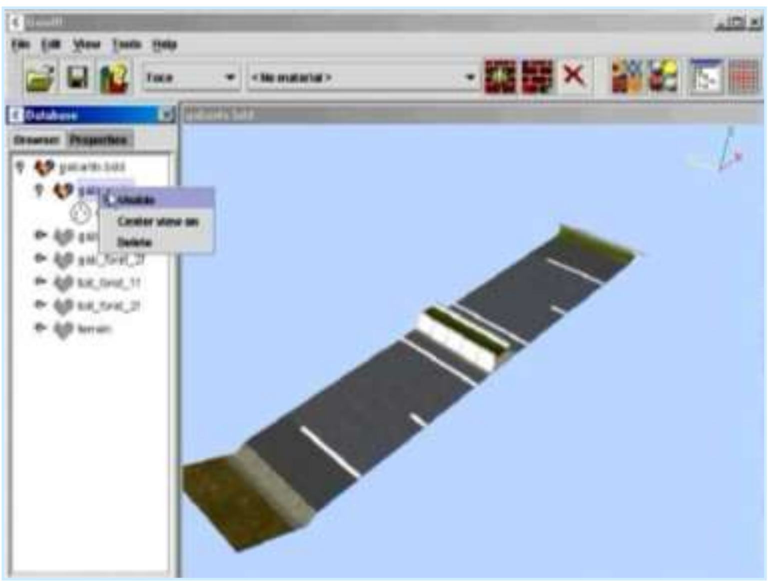
At spectral physical data level (EP + RF)
➲?

At procedural level (EP + RF)
➲ ?

Current OKTAL-SE interoperability state

Terrain modeller work data

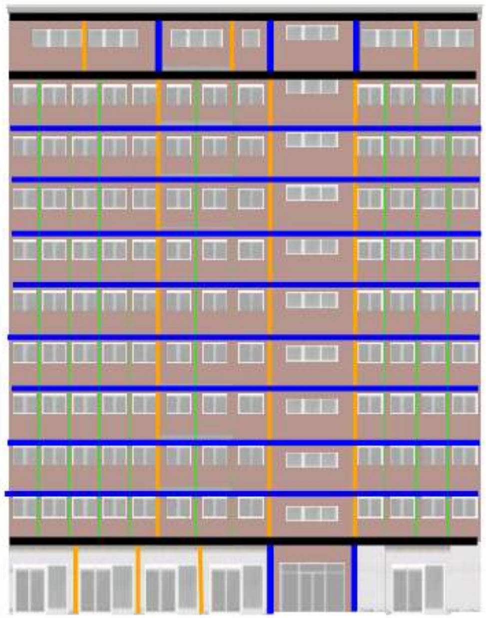
Rules for terrain features
(SE-AGETIM)

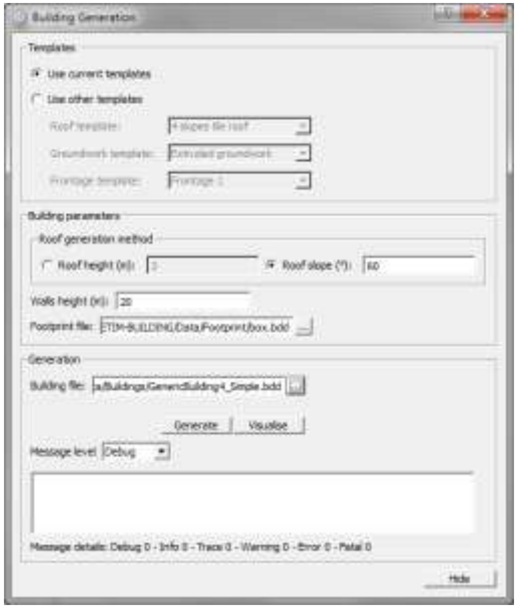


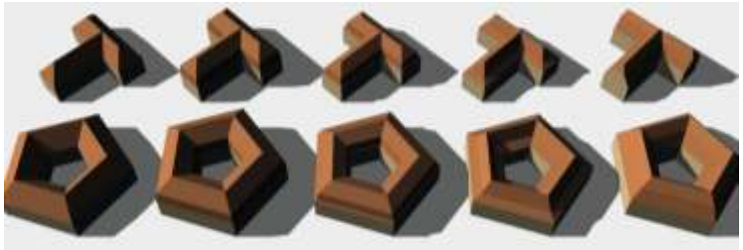
Current OKTAL-SE interoperability state

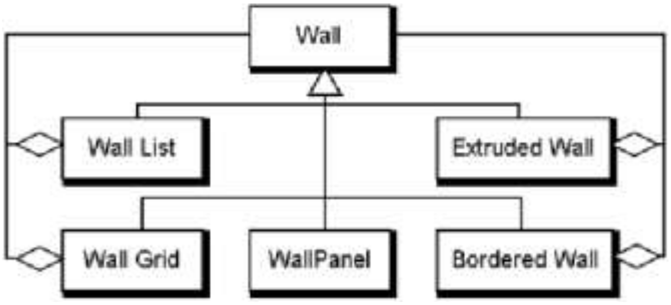
Terrain modeller work data

Rules for extruded objects **(SE-AGETIM-BUILDING)**





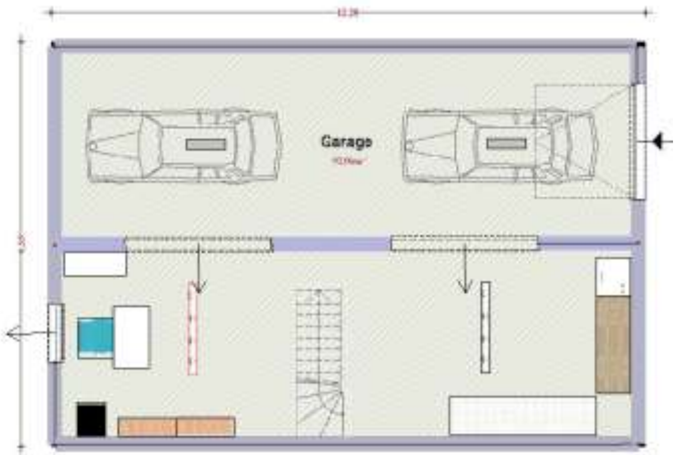




Current OKTAL-SE interoperability state

Terrain modeller work data

Rules for indoor parts **(SE-AGETIM-INDOOR)**



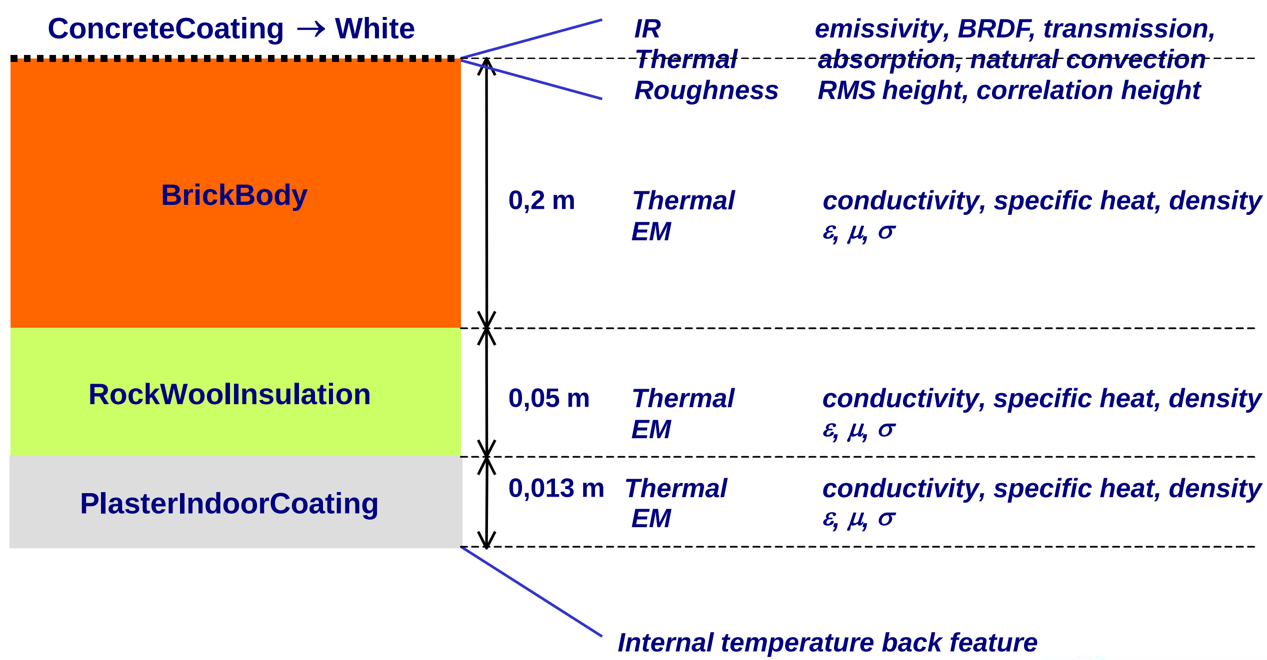
Current OKTAL-SE interoperability state

Spectral physical data level

Example of a "wall" material

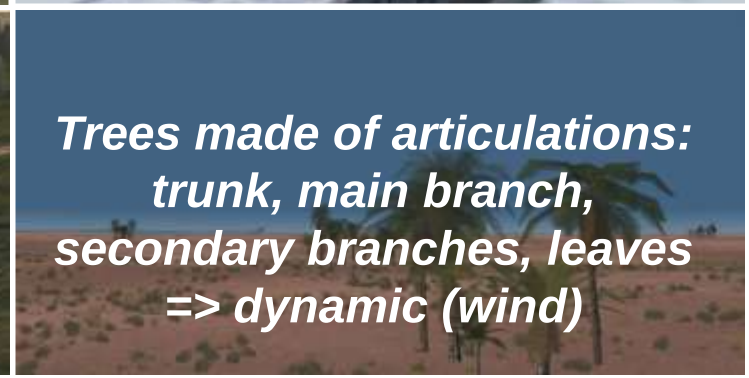
Hierarchical definition of the fact that it is a building, then the building type, then the building part, then the coating, then the color, then the body structure and finally the insulation system

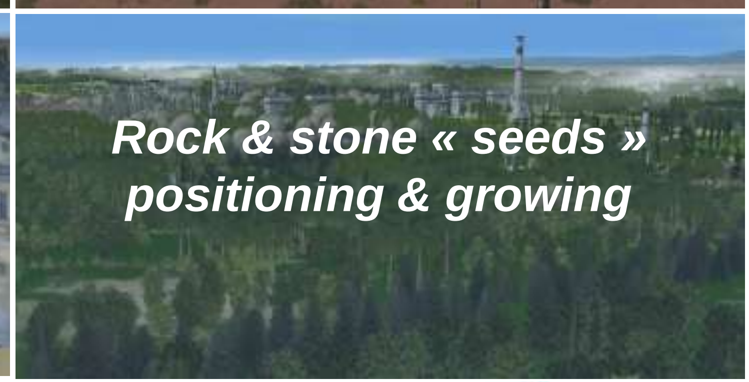
Building → Industrial → Wall → ConcreteCoating → White → BrickBody → RockWoolInsulation → PlasterIndoorCoating



Current OKTAL-SE interoperability state

Procedural data





CONCLUSION

OKTAL-SE has a strong experience in the field of new SE data structure.

OKTAL-SE would like to participate to a standard common definition for:

- Terrain modeller work data
- Spectral physical data
- Procedural data

CONTACTS

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Sales Director: Nicolas DOUCHIN
International sales: Pierre-François PEYRARD, Grégory MOURA
France: Pierre NOUBEL