

Renaissance of strategic ESM systems with tactical scope

Presented by Jakub Thomas



CHALLENGES

Reaction Time

Target Detection & Discrimination & Identification

Sensor Survivability

New Type of Threats

Interoperability

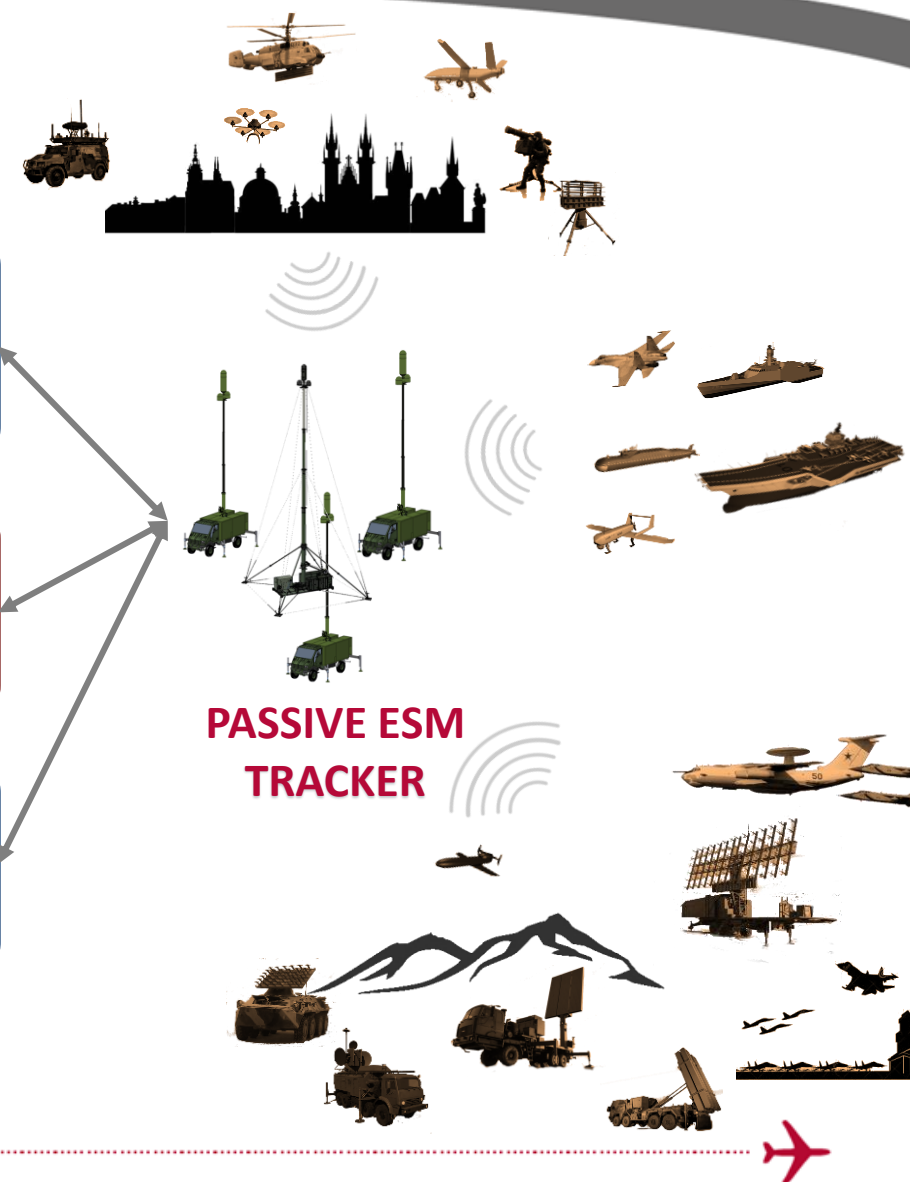
Economy & Effectiveness

Air Surveillance

Electronic Warfare

Air Defense

PASSIVE ESM TRACKER



A ROLE OF PASSIVE ESM TRACKER



Target's Detection and Tracking

Signal Pattern Survey

Maintaining the EDB

Covert Mode of Operation

Distributed System Architecture

Fighter Jet 01
Surveillance Mode
x: 15600 m
y: 13200 m
z: 132457 ft



SOLUTIONS



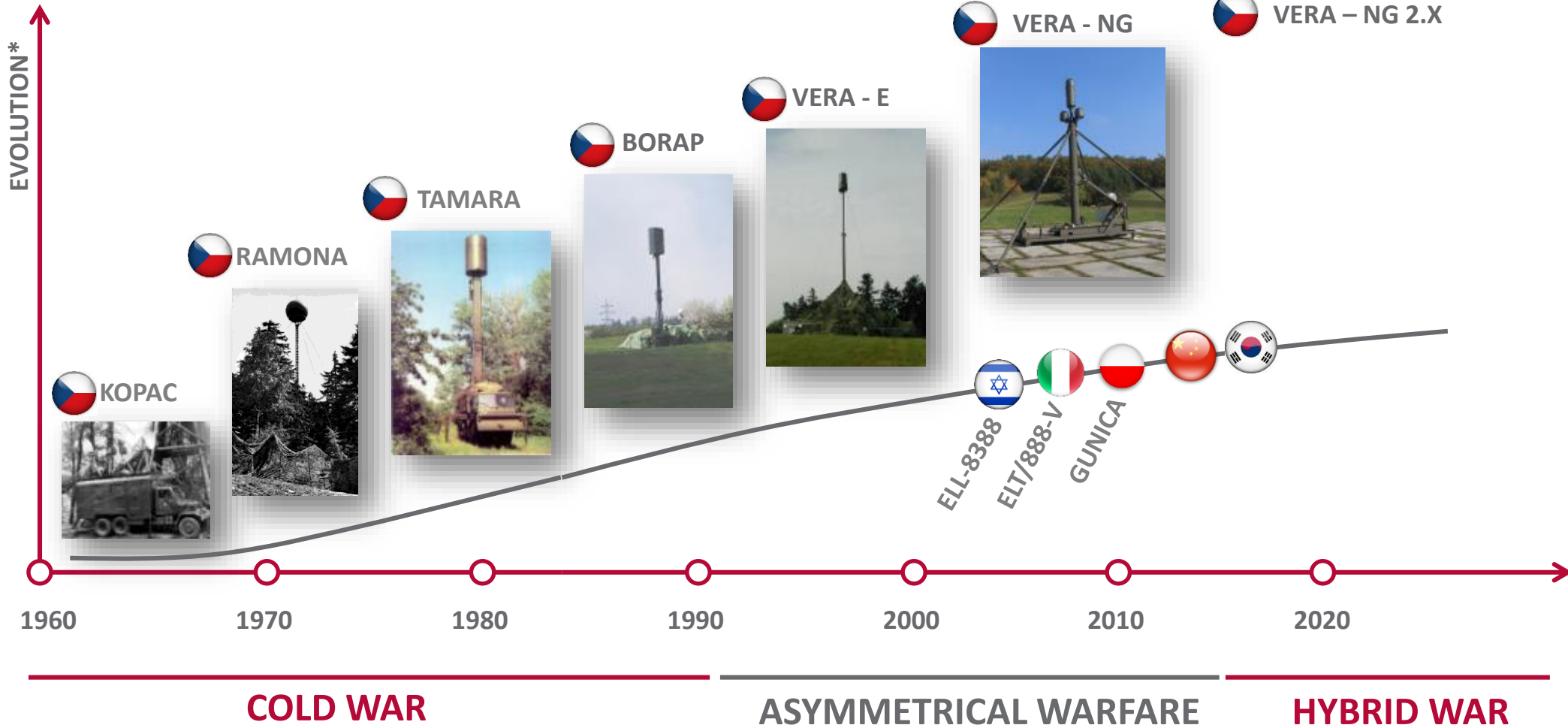
AD
(Air Defence)



EW
(Electronic Warfare)



EVOLUTION OF PASSIVE ESM TRACKER



*DFs are frequently categorized among PET



COLD WAR

PET invented for strategical purposes during 60s.

Key focus was on long range surveillance and target analysis with stress on positioning and high update rate.

Operated mainly as a stationary solution.

ASYMMETRICAL WARFARE

PET started to evolve towards “tactical” use following EOB changes.

Focused more on an analysis of much broader types of targets with rough positioning but close to real time information distribution.

Interoperability with other ESM means and data fusions.

Mobility and transportability.

HYBRID WAR

Universal all purpose solution combining all previously gained features.

High demand on automatization and autonomous operation.

New features to deal with modern emitters.



TECHNOLOGY OVERVIEW: DIRECTION FINDER AND PASSIVE ESM TRACKER



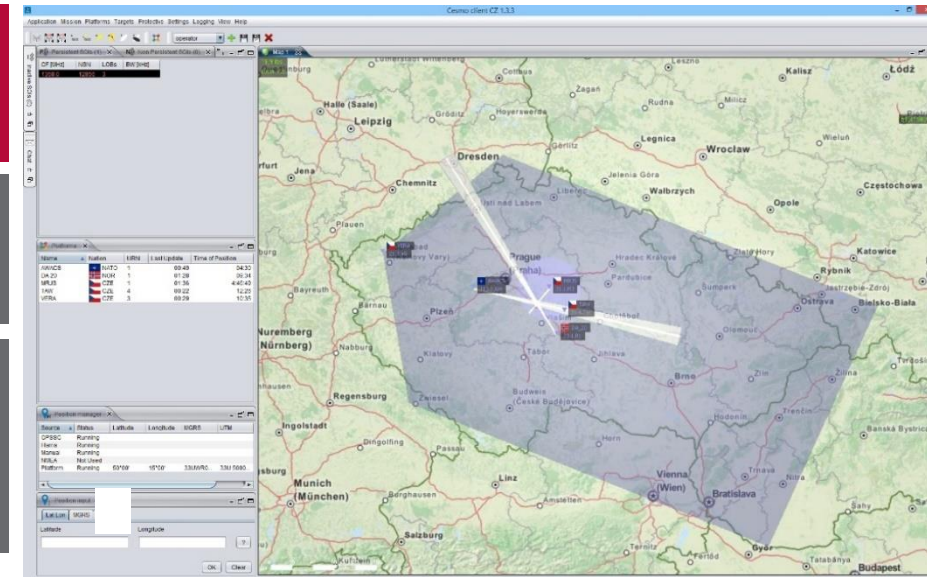
	DF	PET
Singal types	Pulse, CW	Pulse, CW
Bandwidth	High Surveillance, High Analysis	High Surveillance, High Analysis
Configuration	Single site or centristic aproach	Naturally multisite
Performance	Low-Medium (Tracking of Fast Moving Targets)	High (Tracking of Fast Moving Targets)
Altitude	-	Yes
LPI	Low detection, Higher positioning	High Pd of detection, Lower positioning (solved by PCL)
Automatization	Yes	Yes
Synchronization	Rough	Precise (but independent on GNSS)
ECM	Single PoF	Redundant architecture



Collaborative Electronic Support Measures Operations (CESMO):

Cooperative geolocation of signal emitter by fusing feeds from multiple independent ELINT or ESM platforms (mainly DF).

‘System of systems’ approach creates a virtual set of many more LOBs than can ever be collected by a single platform during the time the emitter is active.

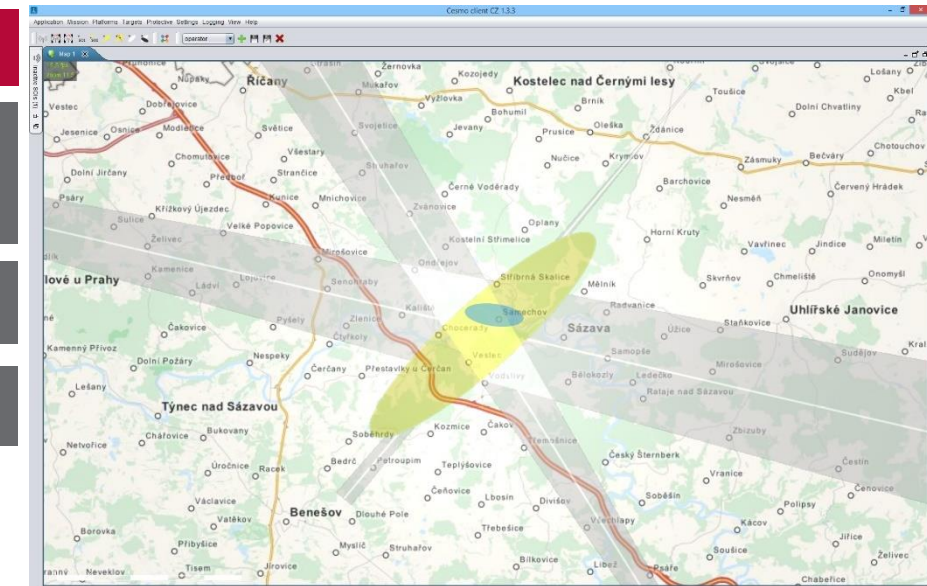


PET Contribution:

Already implemented since natural 3D geolocation in real time provided by the sensor.

Exceeds in accuracy by high order.

Exceeds by number of simultaneously tracked targets.





EVOLUTION OF PET - NEW FEATURES

Wider instantaneous spectrums for survey, tracking and analysis modes

New type of signals related with not only air, land but also naval

Higher level of automatization. EDB driven modes.

CW signal tracking and analysis

Automatic Non Cooperative Target Identification

Extensions of EDB due to new target features

Size and weight

Lower frequency
bands

Number of
simultaneously
tracked targets



NON-EMITTING TARGETS

Multistatic Primary Surveillance Radar (MSPSR)

PASSIVE - PCL

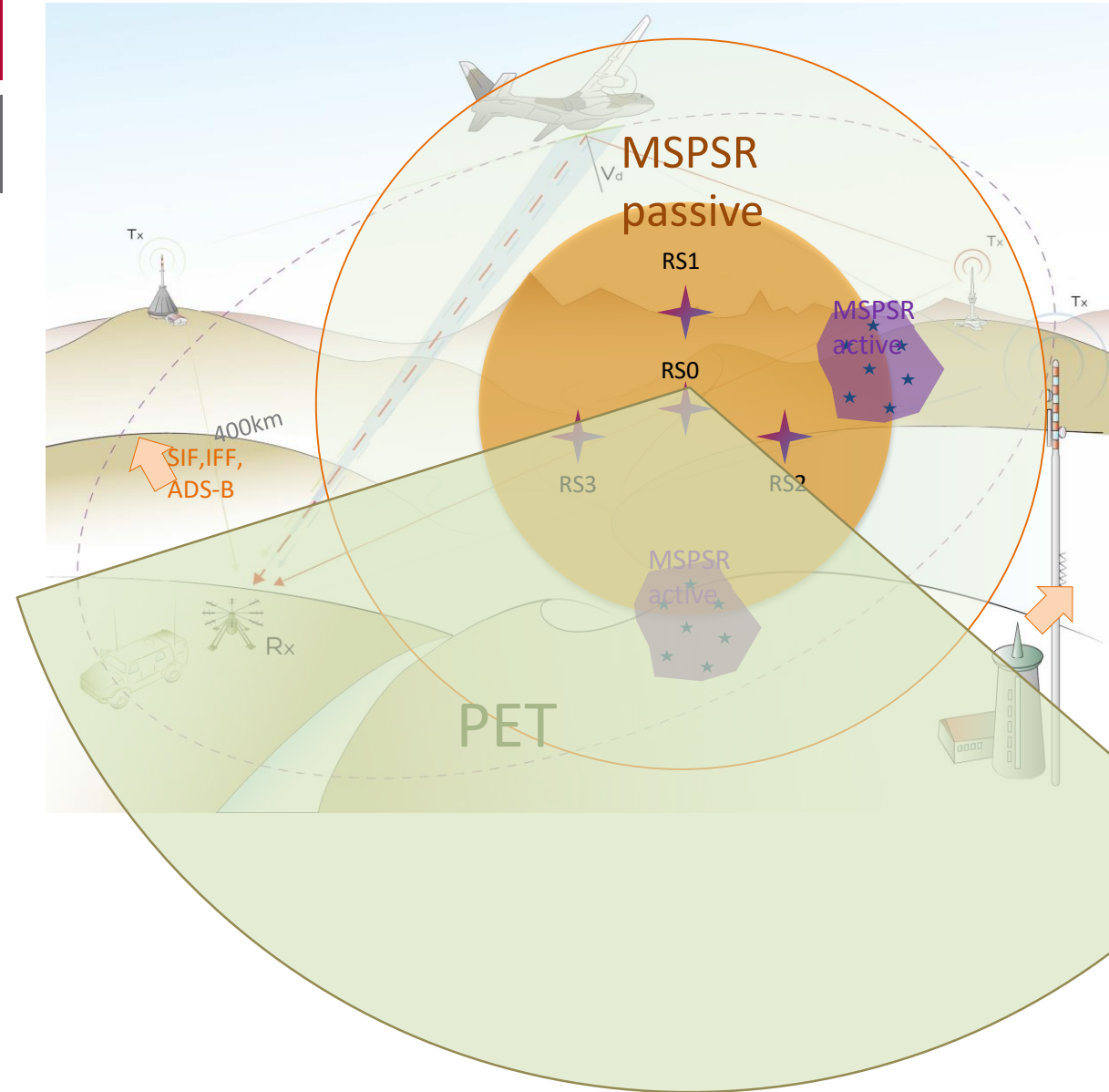
ACTIVE

PET-PCL concept brings covert detection and tracking of all types of emitting as well as non-emitting targets

Covert mode of operation

3D Positioning

Distributed system - Survivability



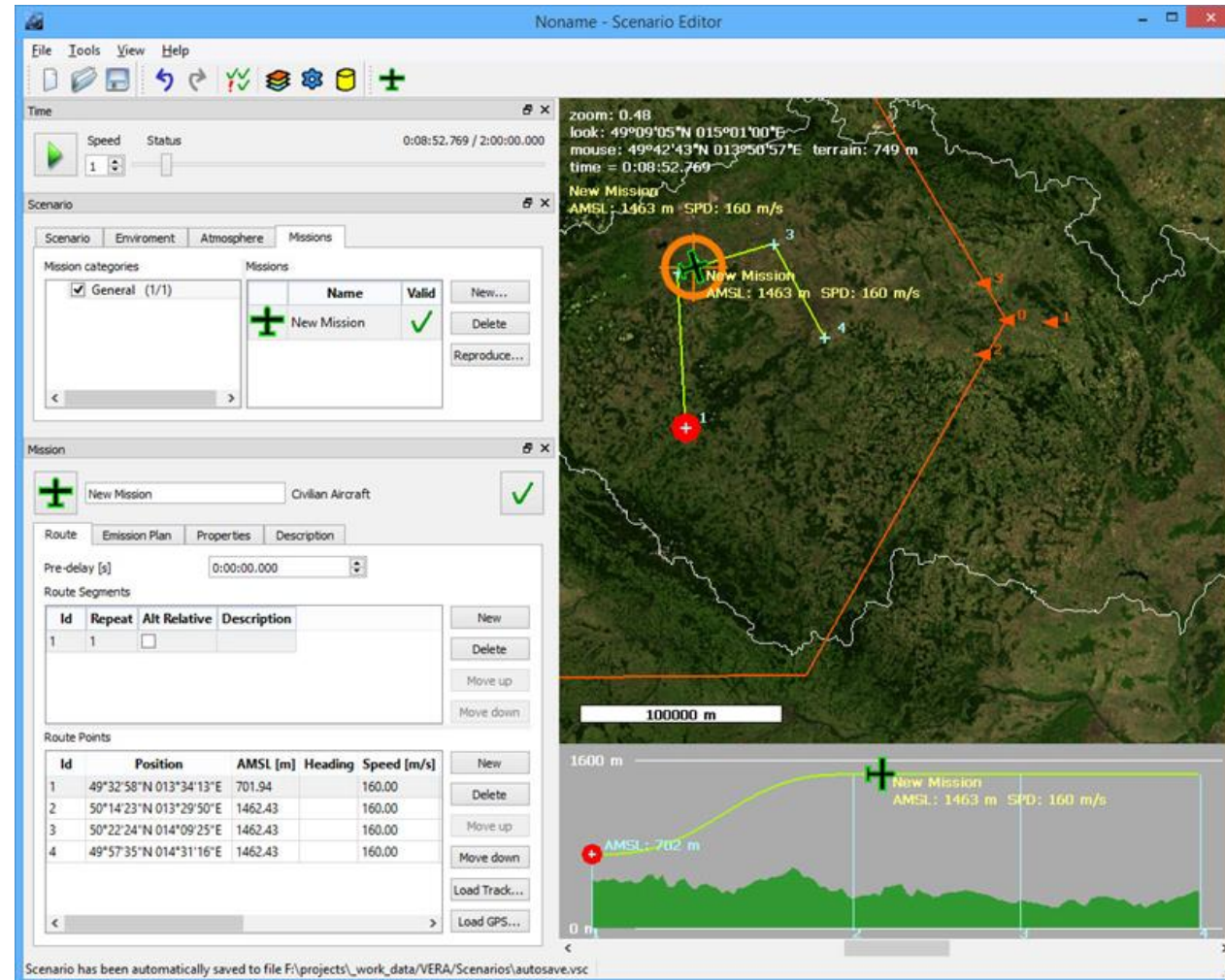
More and more sensor features increase req. on operator skills and knowledge.

Moreover cannot be all of them evaluated in real (piece time) environment.

Simulator of high importance to any ESM system.

Training with possibility to model any scenario which might happen close to real time.

To evaluate system performance vs prediction (Mission Planning tool outputs) vs reality



The screenshot displays the 'Noname - Scenario Editor' interface. It includes a menu bar (File, Tools, View, Help), a toolbar, and several panels:

- Time Panel:** Shows speed and status controls, with a timer at 0:08:52.769 / 2:00:00.000.
- Scenario Panel:** Contains tabs for Scenario, Environment, Atmosphere, and Missions. It lists mission categories (General (1/1)) and a table of missions.
- Mission Panel:** Shows details for a 'New Mission' using a 'Civilian Aircraft'. It includes a 'Pre-delay [s]' field and a 'Route Segments' table.
- Route Points Table:**

Id	Position	AMSL [m]	Heading	Speed [m/s]
1	49°32'58"N 013°34'13"E	701.94		160.00
2	50°14'23"N 013°29'50"E	1462.43		160.00
3	50°22'24"N 014°09'25"E	1462.43		160.00
4	49°57'35"N 014°31'16"E	1462.43		160.00
- Map:** A satellite-style map showing a flight path with numbered points (1-5) and a 'New Mission' point. A scale bar indicates 100000 m.
- Terrain Profile:** A graph at the bottom right showing terrain elevation (0 to 1600 m) and the mission's altitude profile.

Scenario has been automatically saved to file F:\projects_work_data\VERA\Scenarios\autosave.vsc





THANK YOU FOR YOUR ATTENTION