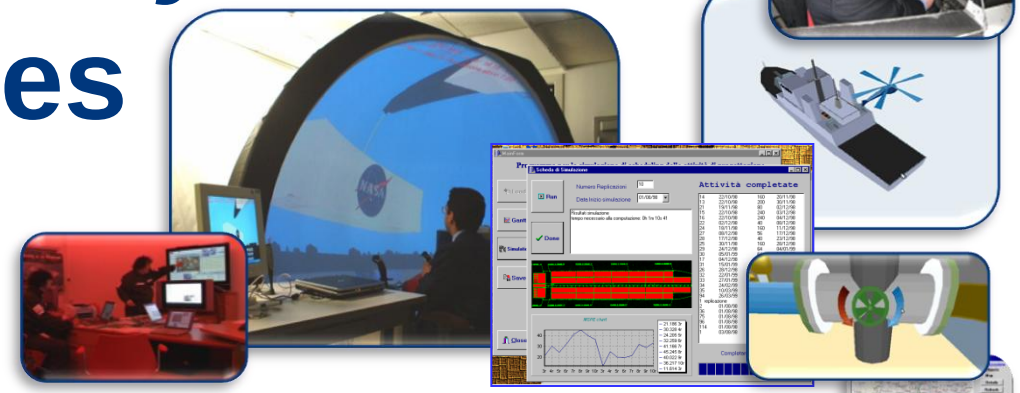
Simulation Team

Modeling & Design of Complex System:

Case Studies



Liophant Simulation

M&S Net

MITIM Simulation Team Genoa Center

McLeod Institute of Technology and Interoperable M&S

Genoa Center

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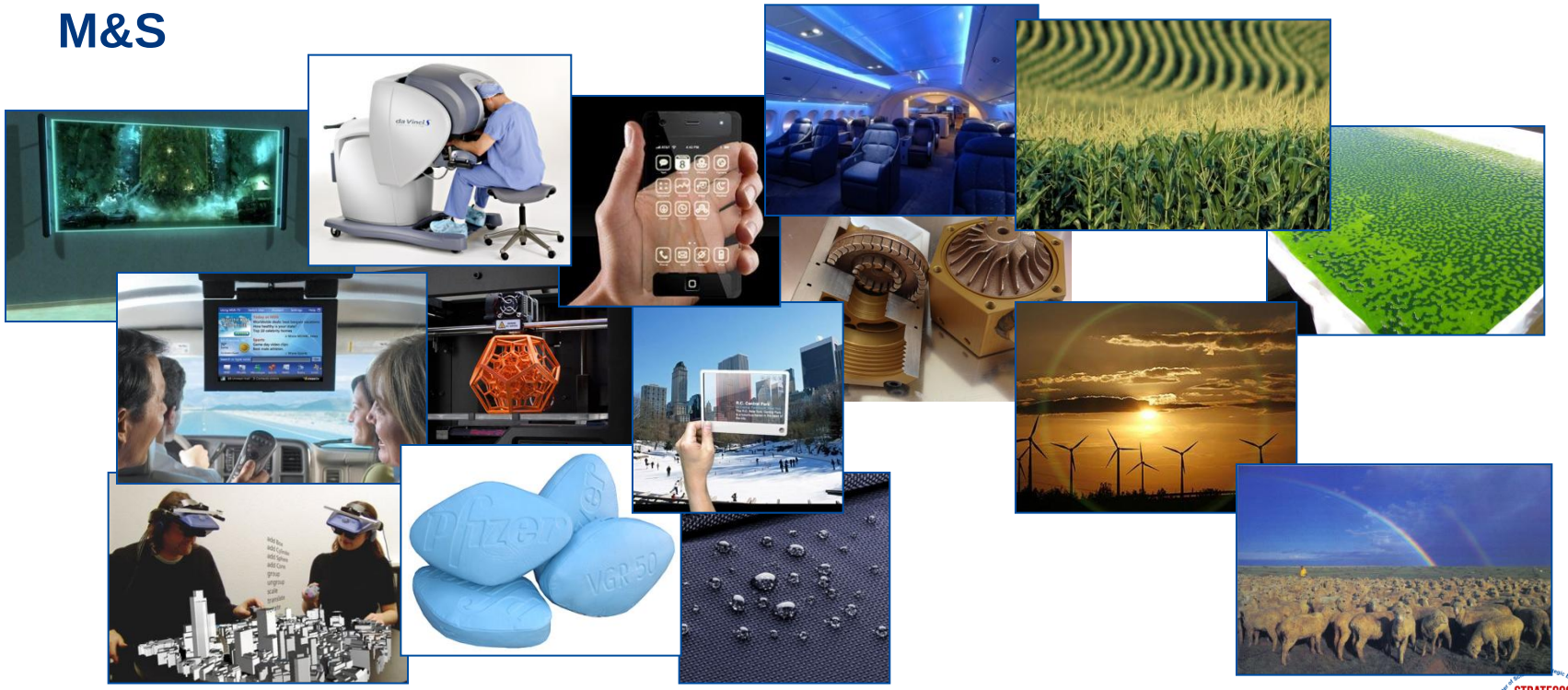
DIPTEM
University of Genoa

Simulation Team

New Solution for Modeling Complex Systems

The Future as Opportunity based on Innovation

Breakthrough Technologies are the opportunity to guarantee competitiveness and needs strong support from M&S



Simulation Team

Example of Overall Architecture

Smart Planner

Man on the Loop

VR & AR

Real Situation

Manual & Automated Planning

Simulation

Simulation for Optimization & Alternative Evaluation Based on Intelligent Agent

MR

Multiple Methods for Analyzing Historical & Current Data

Data Analytics

Innovative solutions integrating Artificial Intelligence, Simulation, VR & AR, Data Analytics for improving the whole process

Simulation Team

Enabling Technologies

We propose new Solutions to Major Problems based on Enabling Methods & Technologies

- Big Data
- Data Analytics
- Machine Learning

- Robotic Process Automation
- IoT & IoE

- Modeling, interoperable Simulation & Serious Games
- Virtual & Augmented Reality

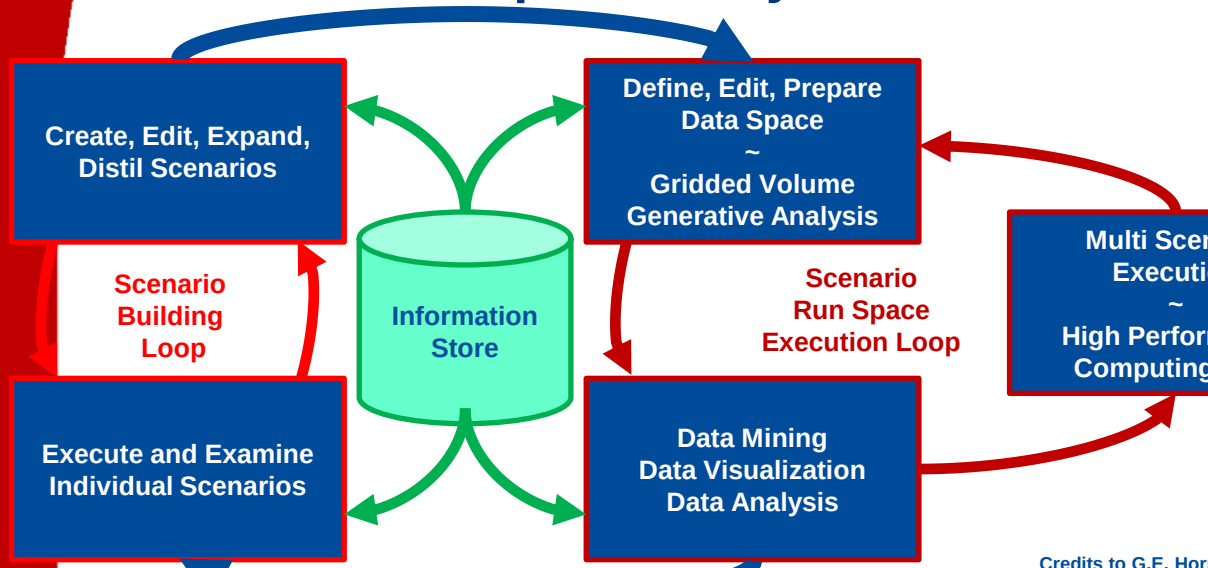
Simulation Team

Data Opportunities: Big Data & Data Farming

We have to guarantee Data Dominance being able to:

- Mine Data received by IoE and IoT
- Data Farming about Future by M&S
- Extract & Process Information
- Complete Analysis & Draw Conclusions

IoT Internet of Things
IoE Internet of Everything

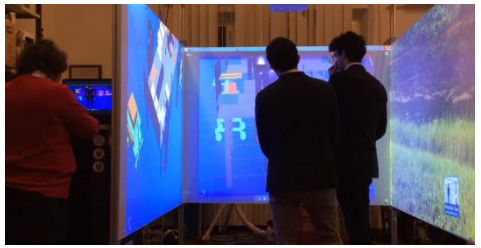


Smart Simulation is allowing to develop new Models based on Big Data and to feed Investigators by Data Farming & enabling the use of Crowdsourcing

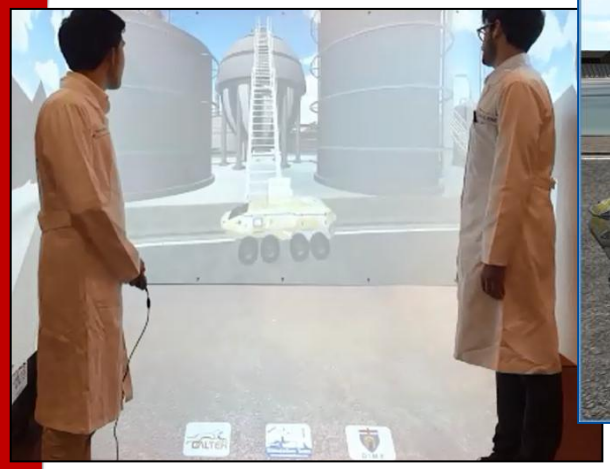
Credits to G.E. Horne & K-P. Schwierz for Data Farming Iterative Process Scheme
Credits to M.Massei & G.L.Maglione for ST_VM as Example of Lean Simulation based on DOE & Data Farming

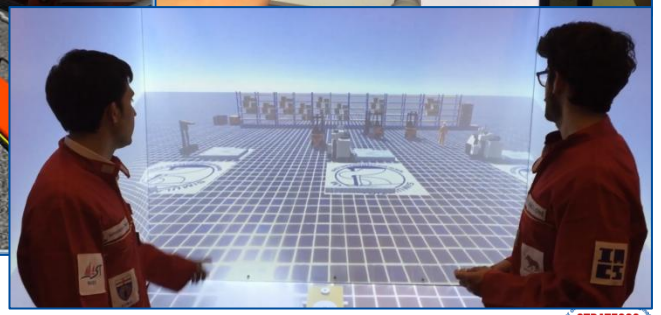
Simulation Team

MS2G Paradigm as new Enabler

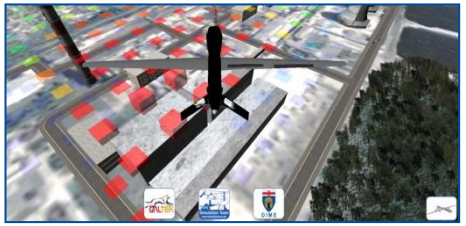


The innovative concept of *MS2G* (*Modeling, interoperable Simulation and Serious Games*) allows to develop interoperable scalable and reusable simulators with benefits of new Immersive Solutions. MS2G is very flexible and enable use from different platforms: regular laptops, computers, CAVE (Computer Automatic Virtual Environment) large enough to immerse 4-5 people in the Virtual World, HDM, HoloLens as well as Smartphones and Tablets



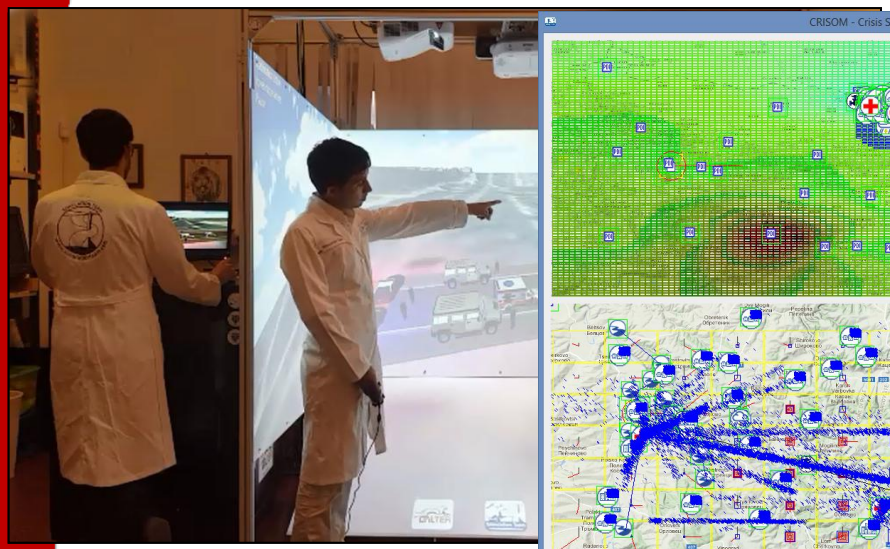


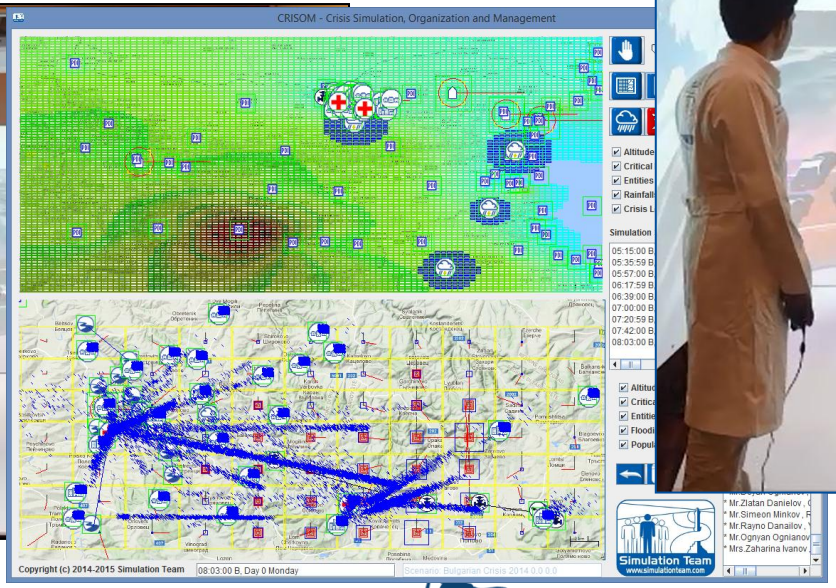
Simulation Team



MS2G and IA-CGF

The MS2G (Modeling, interoperable Simulation and Serious Games) could be combined with use of IA (Intelligent Agent such as IA-CGF by Simulation Team). The AIs (Artificial Intelligences) drive concurrently many actors, people and related actions enabling to recreate and study very complex scenarios to improve simulation capabilities & Training Efficiency





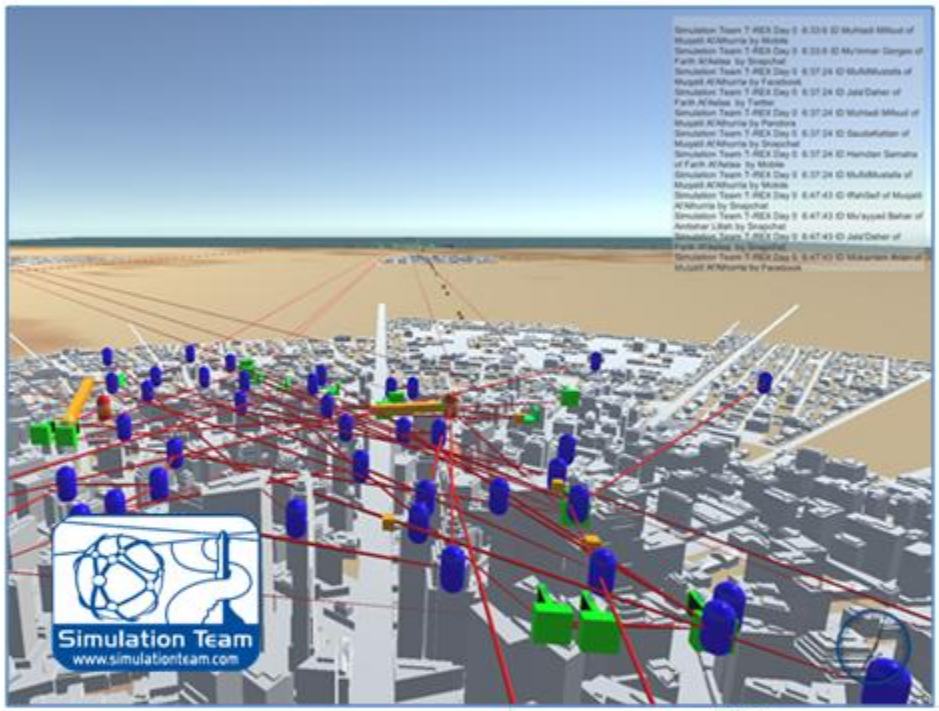
Simulation Team

Case Studies

Simulation Team

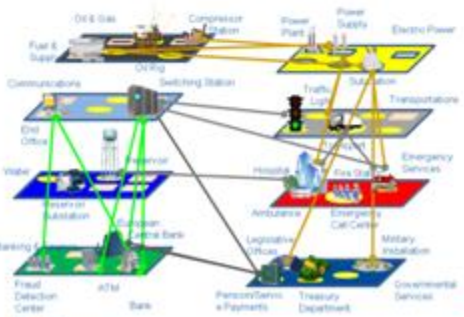
MLEA

Multi Layer Engineering Approach



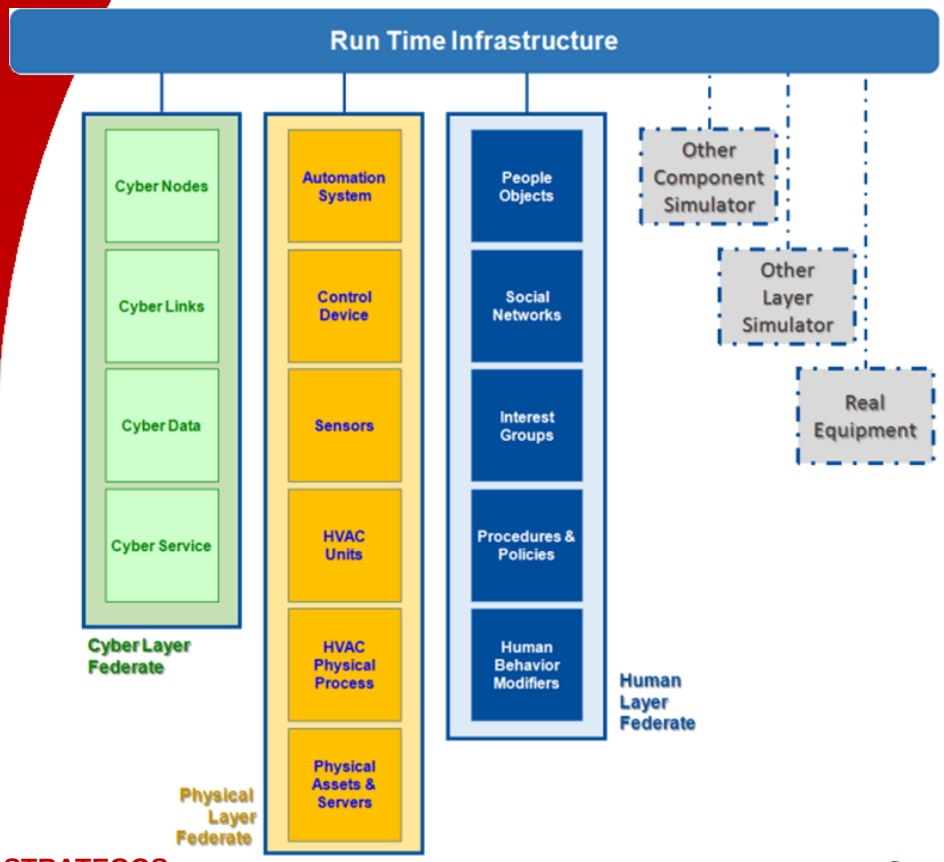
Modern systems, plants, buildings and infrastructures are usually related to Multiple Layers and they requires to Model & Simulate these aspects to address their complexity as well as issues facing Safety & Security. MLS is a new approach fundamental for :

- Engineering
- Safety and Security
- New Policies & Procedures
- New Technologies and Processes
- Education & Training Programs for Multiple Players



Simulation Team

Cyber as the New Dimension

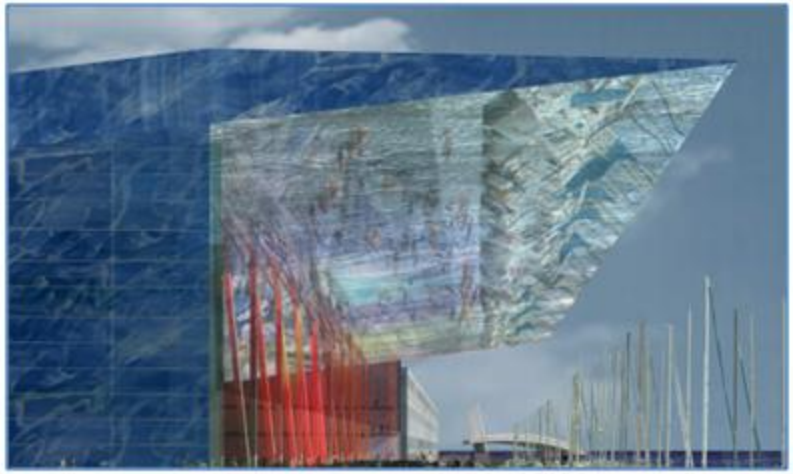


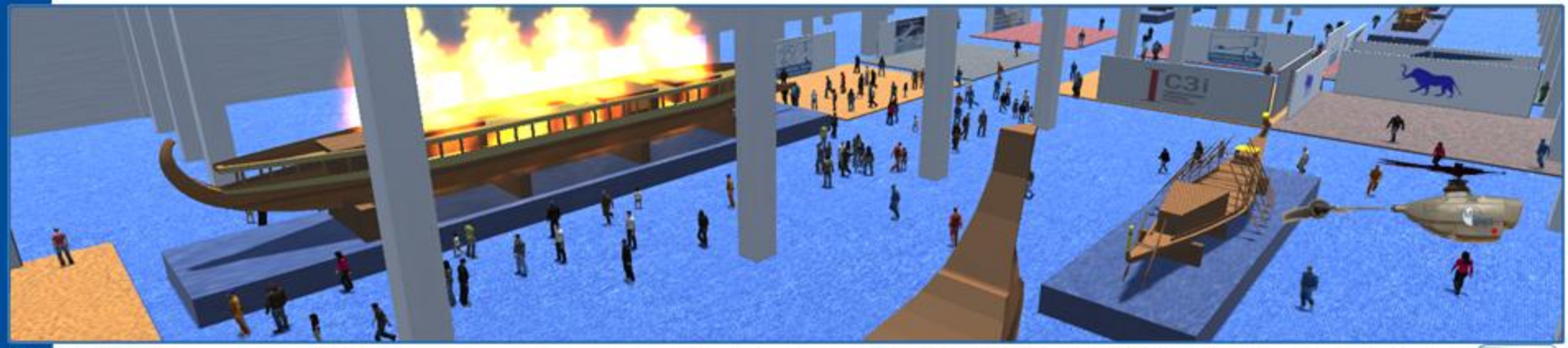
Safety and Security needs more an more to be addressed by a Joint Approach

Blue Project

The Multi-Layer Engineering Approach at Work

Blue Exhibition Hall is a project related to a major fair infrastructure were Safety and Security Solutions have been developed by the applying the **Multi-Layer Engineering Approach** based on **Simulation** to protect **Humankind's Heritage** Exhibition





Research carried out Jointly by Simulation Team, DIME, MIPET, SIM4Future, C3I, Orvieto Studio

Simulation Team

MLEA for S&S

Multi Layer Engineering Approach for Safety & Security

Key Note Presentation invited at World Engineering Forum

Simulating: Joint Threats, WiFi & Speakers hacking, Fake News, attracting People in most critical area, Blocking Doors by Cyber, using Drones to disable Fans, igniting Fire, using Trucks to block Exits and to create Panic

DROTHS

DROne THreat Simulator

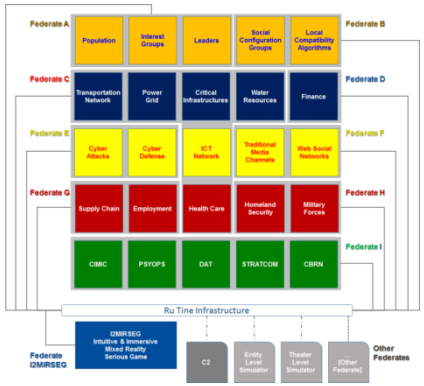
Simulation Team

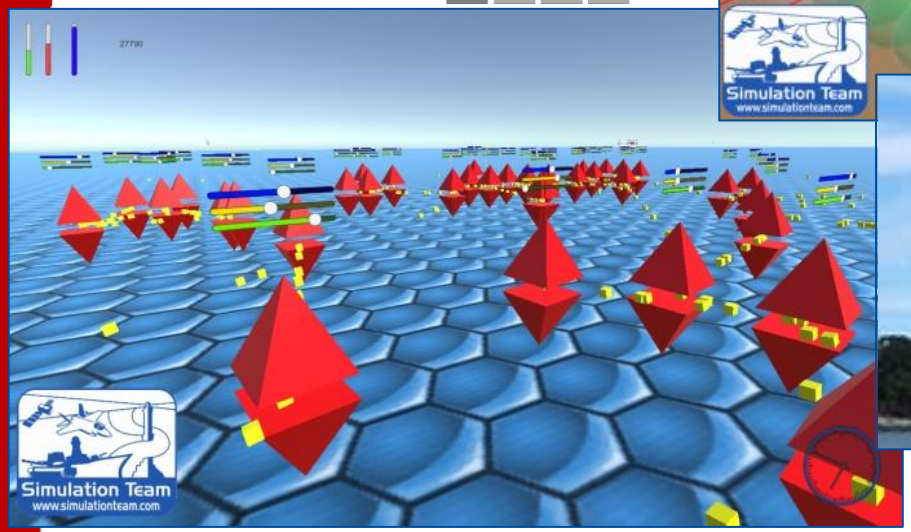
DROTHS is a MS2Gs (Modeling & Interoperable Simulation and Serious Game) devoted to investigate the vulnerabilities due to the use of Drones, UAV (Unmanned Aerial Vehicles), UGV (Unmanned Ground Vehicles), UUV, USV and other Autonomous Systems. The Scenario covers Multiple Mission Environments including the Protection of Critical Infrastructures. DROTHS simulates the interactions of Drones with other assets including traditional ones over multiple domains, including Cyber. This approach allows to simulate H*ard & Soft Kill* and different Doctrines & Technologies. DROTHS quantifies Risks, Vulnerability Levels, Damages, *Measure of Merits*. The Simulator is able to operate *Stand Alone* as well as *HLA Federate* and it is driven by *Intelligent Agents* Driving Actions of Different Parties & Civilians

UUV Unmanned Underwater Vehicle
USV Unmanned Surface Vehicle

Simulation Team

Creating Comprehensive Environments





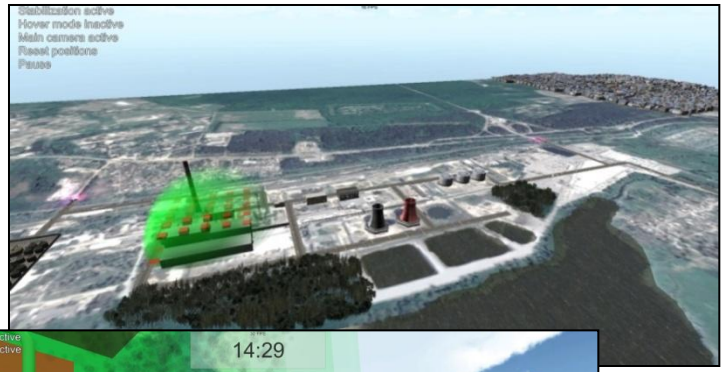
In this example it is simulated critical infrastructure, ICT Network, Social Networks and Demand

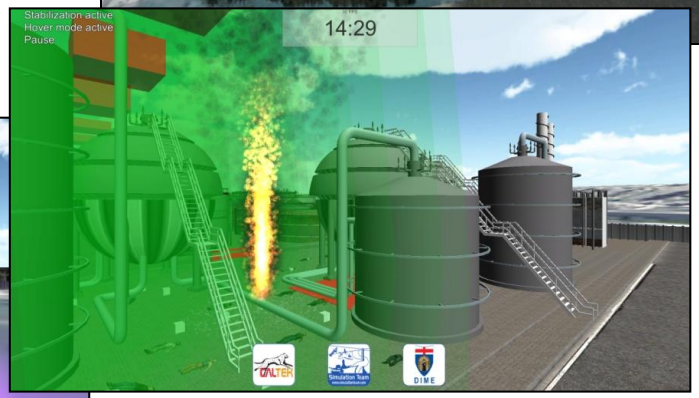
Simulation Team

IDRASS

Industrial Dynamic Representation of Autonomous Systems by Simulation

IDRASS (*Industrial Dynamic Representation of Autonomous Systems by Simulation*) is a MS2G (Modeling, interoperable Simulation & Serious Game) operating in multiple modes: standalone, federated in HLA, integrated through IoT (Internet of Things), Education & Training, Assessment IDRASS has been applied to different cases including Accidents in Industrial Facilities, Nuclear Plants, CBRN attacks, anti-Terrorism, CWA and RDD. IDRASS is an interoperable real and fast time simulator.



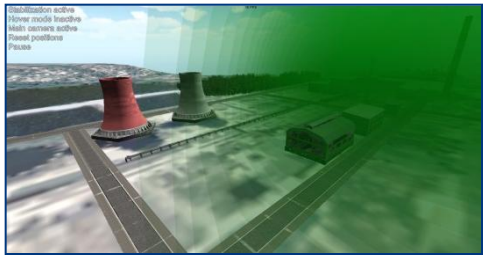


RDD Radiological Dispersal Device
CWA Chemical Weapon Agent
HLA High Level Architecture

Simulation Team

ARTEM

Augmented Reality TErrain interoperable Module



ARTEM (Augmented Reality TErrain interoperable Module) is a Module integrated through High Level Architecture with MS2G (Modeling, interoperable Simulation & Serious Game) systems.

ARTEM allows to present over smartphone and other mobile device the situation in real-time geo-referenced dynamically respect the on going simulation.

ARTEM provides the opportunity to train personnel directly on the field using details models and simulator that interact dynamically with personnel and assets during the exercises.

The system allows to visualize real and virtual assets as well as different effects on the terrain.

Simulation Team

SISOM Project

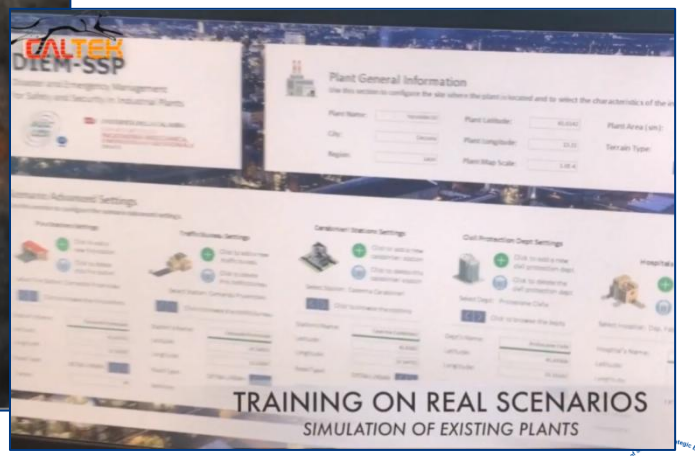
SISOM Project allowed to study and implement Innovative Solutions to be applied to real cases to improve Safety, Efficiency and Effectiveness in relation to Industrial Machines. SISOM Project was carried out in strict cooperation with different Industries active in Design, Engineering and Production of Industrial Equipment and Machines. SISOM is a joint R&D Project among several Leading Institutions, Universities and Companies. This Project allowed to complete an extensive set of tests and experiments to measure quantitatively the benefits obtained by these Innovative Technologies (e.g. M&S, AR & VR) applied on the real industrial application in terms of training efficiency and safety.

Simulation Team

DIEM-SSP

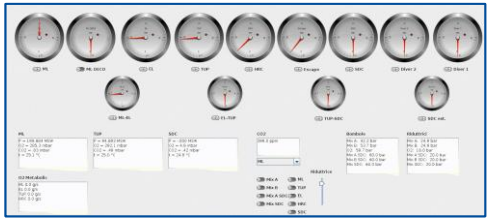
Augmented Reality TErrain interoperable Module

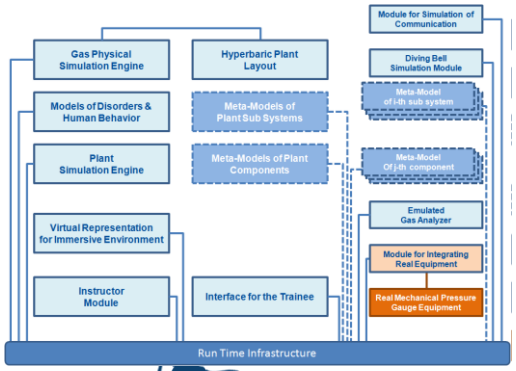
DIEM-SSP is a simulation devoted to create a framework that combines Virtual and Constructive Simulation to support Crisis Management in Industrial Plants. The Models allows to be used as training system both for internal personnel of the Plants as well as for Crisis Managers and First Responders. It could be possible also to use this approach to develop SOP and support Engineering.



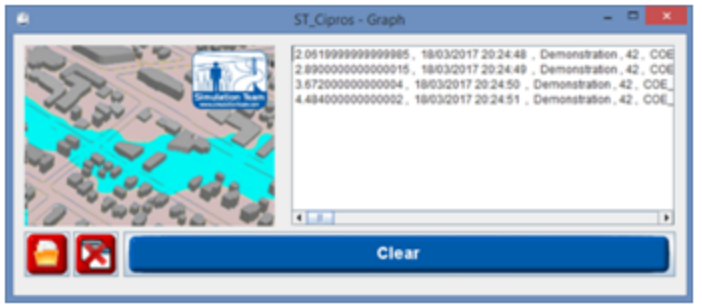
Simulation Team

Simulators for Oil & Gas Underwater Operations





Simulation Team



ST_CIPROS VIS

Simulation Team Civil Protection Simulator

Virtual Interoperable Simulation

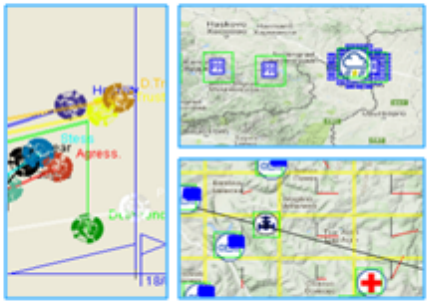
ST_CIPROS (Simulation Team Civil Protection Simulator) VIS (Virtual Interoperable Commander) is a MS2G (Modeling, interoperable Simulation and Serious Game) project for supporting Commander and Staff in addressing a Crisis within a Civil Protection Scenario.

ST_CIPROS provides an HLA interoperable immersive framework for the supporting critical decision making over a complex situation respect different kinds of crisis (e.g. flooding, hazardous material spill, CBRN, fires). ST_CIPROS includes models of Population and Human Behaviors developed by Simulation Team based on IA-CGF. CIPROS could support training and operate stand alone or federated in HLA with CRISOM and/or other simulators

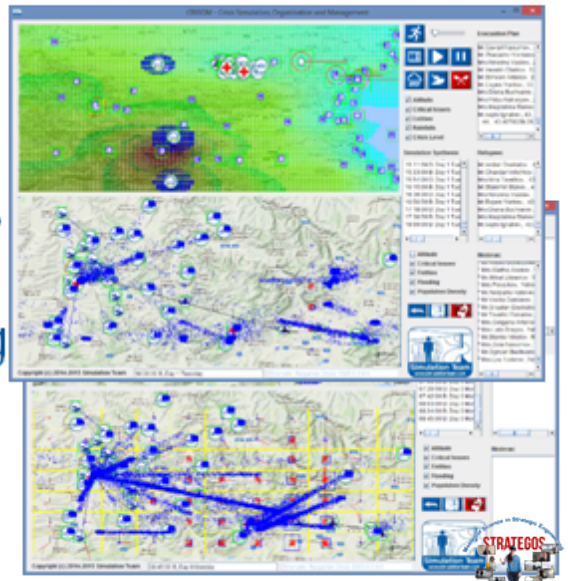
Simulation Team

ST_CRISOM

Simulation Team Crisis Simulation, Organization and Management



ST_CRISOM (Simulation Team Crisis Simulation, Organization and Management) reproduces the dynamics of a complex scenario where a crisis evolves. CRISOM considers the human behavior of the population in terms of evacuations, reactions due to the emergency as well as to human factors such as fear, stress, fatigue and aggressiveness. CRISOM uses the IA-CGF (Intelligent Agent Computer Generated Forces) to reproduce both civilian Populations as well as First Responders and Military Units, Health Care, Civil Protection Agents & Public Infrastructures CRISOM acts as a NCF (Non Conventional Framework) for IA-CGF. CRISOM simulates Flooding Scenario over regional areas and impact on Town, Industrial Facilities and Critical Infrastructures.
It could be federated in HLA with other Simulators.



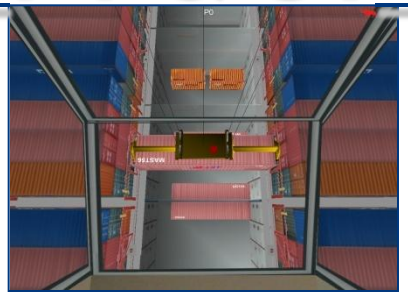
Simulation Team

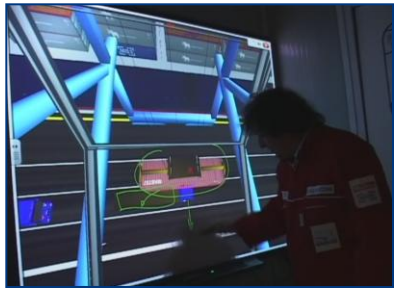
Interoperable Virtual Simulators

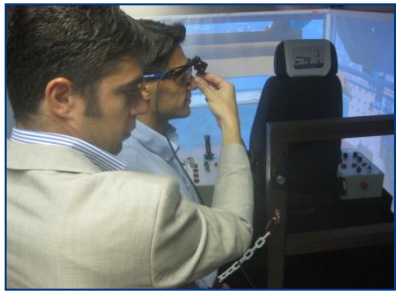
The Simulators developed by Simulation Team are an important support in Training both Operative Resources and Decision Makers. The Interoperability of our simulators is based on state of art standards (i.e. HLA High Level Architecture) and emphasize in addition to traditional
stand-alone training in Operating, even Concurrent Cooperative Training in Operations and Policies; Simulation Team collect long experience in Professional and Executive Training.

Simulation Team

ST_PT & ST_RS Simulators







This new generation of simulator is mobile, real-time, scalable and interoperable and compliant with state of art technology and standards

Shelter & Facilities **ST_PT Crane Sim** **ST_PT Truck Sim**

Atout of our Virtual Simulation

Simulation Team

ST_RS: Truck Simulation

The ST_RS is an Innovative Interoperable Truck Simulator fully integrated with ST_PT and Virtual Port; it provides opportunities for Training, Operative Planning and Terminal Procedure Redesign and Re-Engineering

ST-RS is fully containerized real-time distributed HLA Truck Simulator with Port & Inland Terminal and External Scenarios. ST-RT is integrated in a 40' High Cube Container ready to be used on site immediately after arrival.

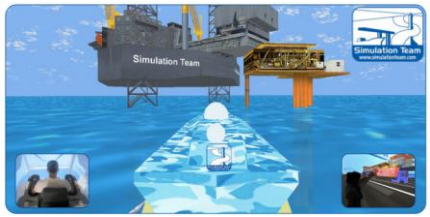
ST-RS Simulator allows to operate Trucks in Terminal and over External Roads within a Virtual World by an immersive Cave (270 ° Horizontal and 130° Vertical), reproducing Sounds, Vibrations and Motion.

ST-RS includes a Full-Scope Simulation for Training Truck Driving, Logistics Procedures, an Integrated Class Room, the Instructor Debriefing Room, and secondary Interoperable Simulators of Different Cranes Cranes, Biomedical Module for Ergonomic and Stress Level Enhancement.

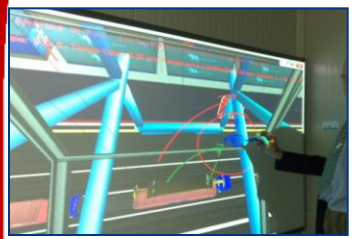
ST-RS World is tailorable for each Terminal Scenario, Truck, Procedure and Equipment.

Simulation Team

ST_VM: Virtual Marine



The ST-VM is the ultimate Marine Simulator developed by Simulation Team and includes many different Marine components, equipment and platforms as well as New Solutions for Terminal Design, Operator Training, Safety and Security, Procedure Definition, Equipment Design and Virtual Prototyping



ST-VM is fully containerized real-time distributed HLA Simulator reproducing Port Operations. ST-VM is integrated in a 40' High Cube Container ready to be used on site immediately after arrival.

ST-VM Simulator allows to operate all the different Marine Devices in a Virtual World by an immersive Cave (270 ° Horizontal and 150° Vertical), reproducing Sounds, Vibrations, Motion in all weather conditions

ST-VM includes a Full-Scope Simulation for Training Operations & Procedures, an Integrated Class Room, the Instructor Debriefing Room, and secondary Interoperable Simulators of different Marine equipment with other modules (i.e. Biomedical Module for Safety, Ergonomic and Posture Enhancement).

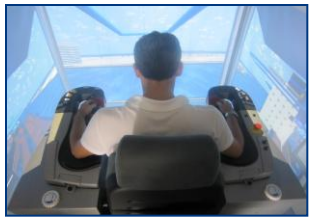
ST-VM World is customizable for each Platform, Port, Crane, Procedure and Equipment.

Simulation Team

ST_VP: Virtual Port Simulation

The ST-VP is the ultimate Port Crane Simulator developed by Simulation Team and includes all the different crane types and New Solutions for Operator Training, Safety and Security, Procedure Definition, Equipment Design and Virtual Prototyping

ST-VP is fully containerized real-time distributed HLA Simulator reproducing Port Operations. ST-VP is integrated in a 40' High Cube Container ready to be used on site immediately after arrival.



ST-VP Simulator allows to operate all the different Port Cranes in a Virtual World by an immersive Cave (270 ° Horizontal and 150° Vertical), reproducing Sounds, Vibrations, Motion in all weather conditions

ST-VP includes a Full-Scope Simulation for Training Operations & Procedures, an Integrated Class Room, the Instructor Debriefing Room, and secondary Interoperable Simulators of all the Port Cranes and a Biomedical Module for Safety, Ergonomic and Posture Enhancement.

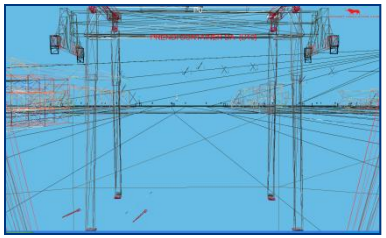
ST-VP World is customizable for each Port, Crane & Procedure and Eq

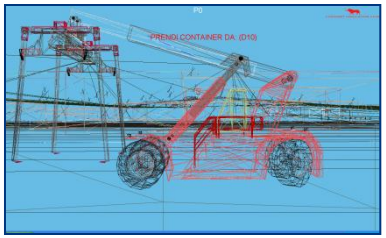
Simulation Team

Virtual Prototyping

The Simulation Team Solutions are very effective as support for Virtual Based Design and Prototyping measuring Real Overall Performances in the Virtual World by considering dynamic interactions among all the Elements and Entities.

Experience was carried out in Equipment, Control and Man-Machine Interface Re-Engineering



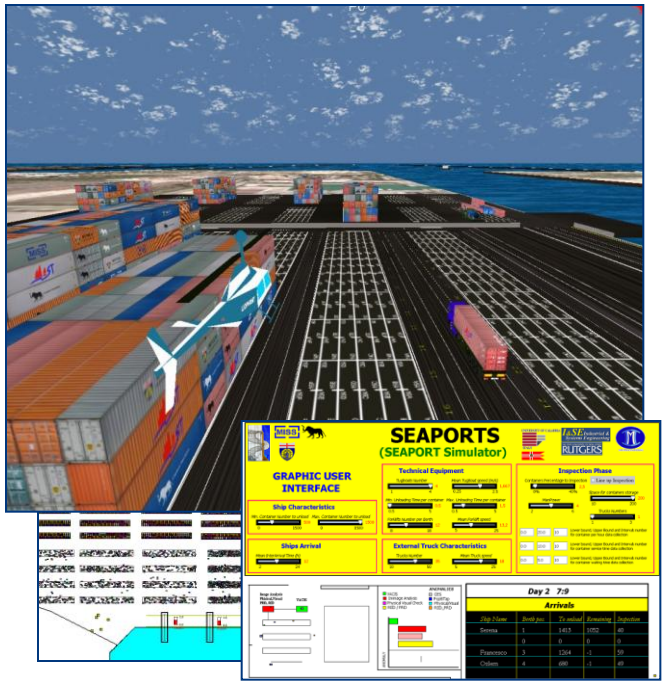


Simulation Team

Virtual Security Assessment and Training

VISAT (Virtual Security Assesment and Training) allows to Simulate Security Issues in Complex Framework such as that one related to Port Environments.

VISAT includes Constructive Sim of organizations and layouts as well as Synthetic Environment for Virtual Sim supporting Distributed Cooperative Training among different Actors (i.e. Port Authority, Coast Guard, Custom Resources, Terminal Operators, Public Urban Authorities) within different Scenarios



Simulation Team

SGT-SDM

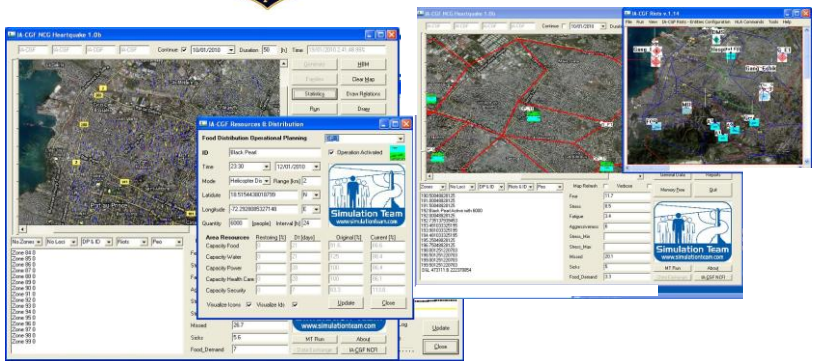
Serious Games for Training in Strategic Decision Making

ACT has activated the SGTSDM as a R&D Project to investigate the use of Serious Games for Training in Strategic Decision Making. The project involves an international team including ACT, NATO Defense College, ARRC, M&S COE, Simulation Team, MITIM DIPTEM University of Genoa and MAST.

Simulation Team

Haiti Case

IA-CGF NCF Riots & IA-CGF NCF EQ



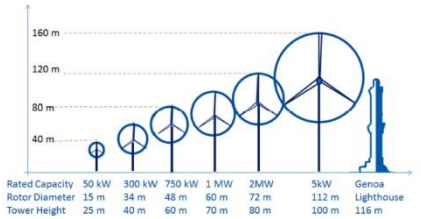
The Demonstration was based Haiti Earthquake 2010 and presented by USJFCOM at ITEC within 2 months.

The demonstration was devoted to show the potential of interoperability in combining different simulators for full coverage of a complex problem such as that one of Haiti.

Simulation Team was involved by using his interoperable IA-CGF reproducing Population Behavior, Human Factors (famine, stress, diseases, fear, aggressiveness), Riots and Gang Activities as well as the impact of the Simulation Earthquake

Simulation Team

MEGACITY

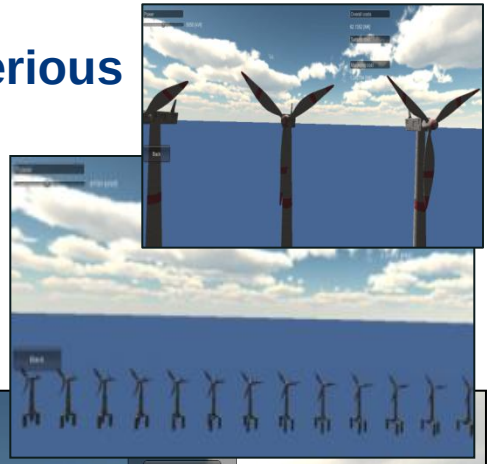


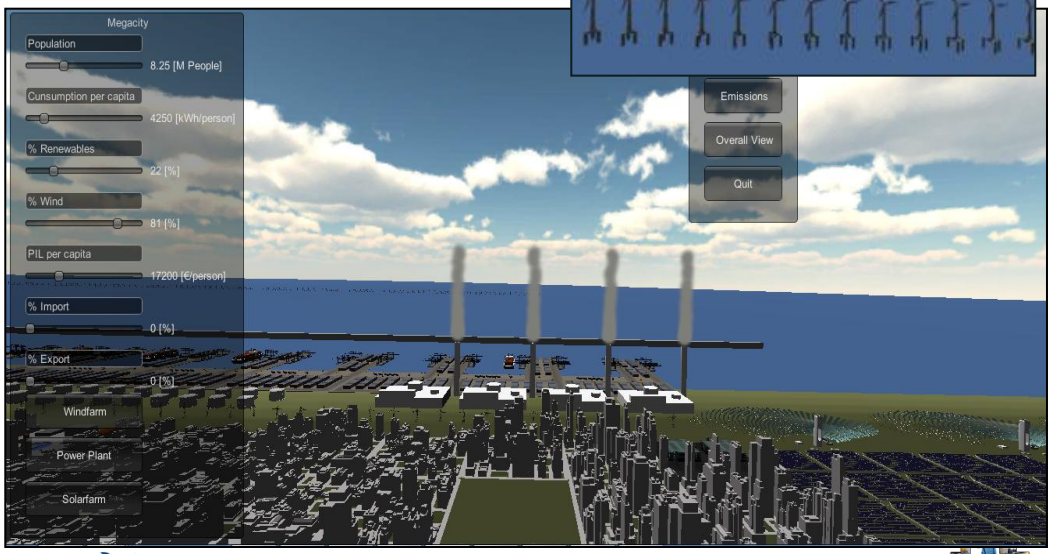
MEGACITY project is a MS2G (Model, Simulation & Serious Game) devoted to investigate scenarios of Megacities projected over 2030, with particular attention to energy, logistics and population demand & services.

The simulator addresses environmental, technical and economic issues, in order to support decision and study the scenario. A Smart Optimizer inside the simulator provides the user with effective proposals.

MEGACITY provides a web immersive virtual framework for crowdsourcing devoted to inform and educate people.

The immersive simulator is self Explaining the situation.





SMARTCITY
Decision Theater

Simulation Team

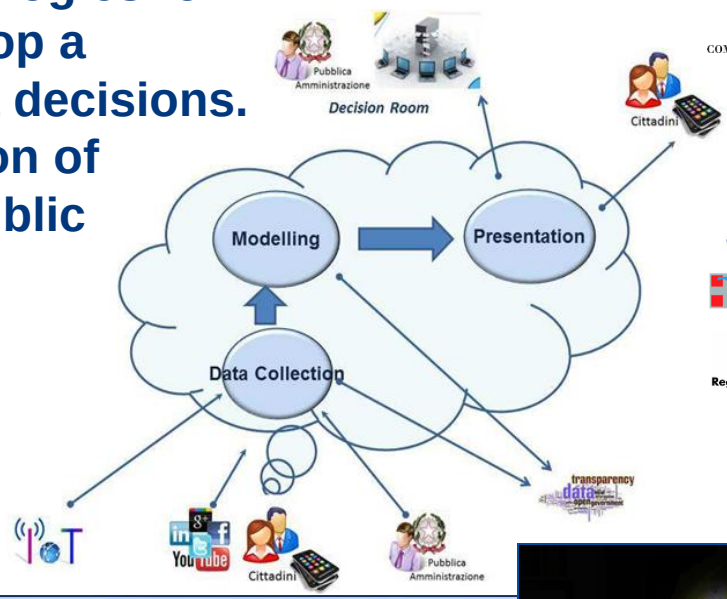
The Decision Theater (DT) Project is a major SmartCity project inserted within Cloud Computing Technologies for Smart Government: the aim is to develop a platform of services dedicated to support decisions.

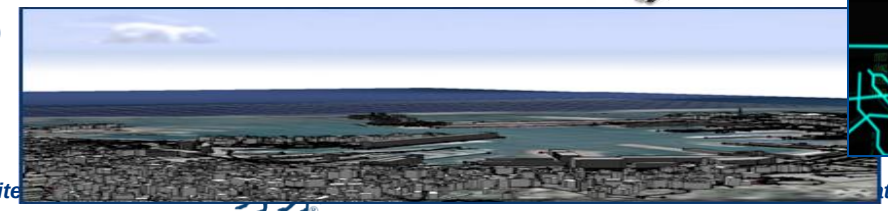
Decision Theater use modeling for validation of alternative solutions and procedures on Public Administration (PA) strategic planning.

Rome, Genoa, Milan and Turin Cities

The experimentation focuses on Flooding and its impact on population..

Simulation Team develops the simulator, Population and Social Network Models as well as the whole scenario





Simulation Team

CUMANA

Cooperative/Competitive Utility for Management and Advanced Networking skill Acquisition

CUMANA is a Web Multiplayer Game that provides the opportunity to play interactively a cooperative/competitive game, in a distributed environment where different "Managers" operate concurrently with benefits and penalties connected to both common and individual objective achievements related to their role in their Corporation.

The main goal is to share information in order to support Decisions Making in a Corporation Framework based on market reports affected by risks

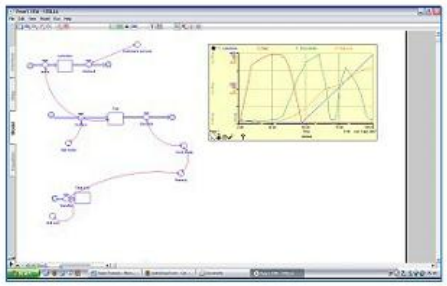
The Identification of the market event in time is the key for individual success of each player as well as the overall corporation, while risks not properly addressed generate losses for the whole players

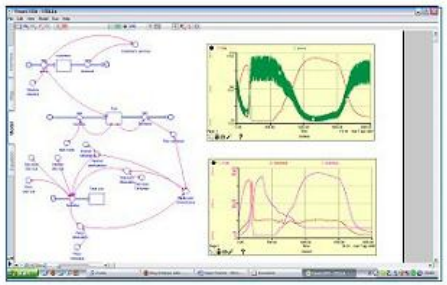
Simulation Team

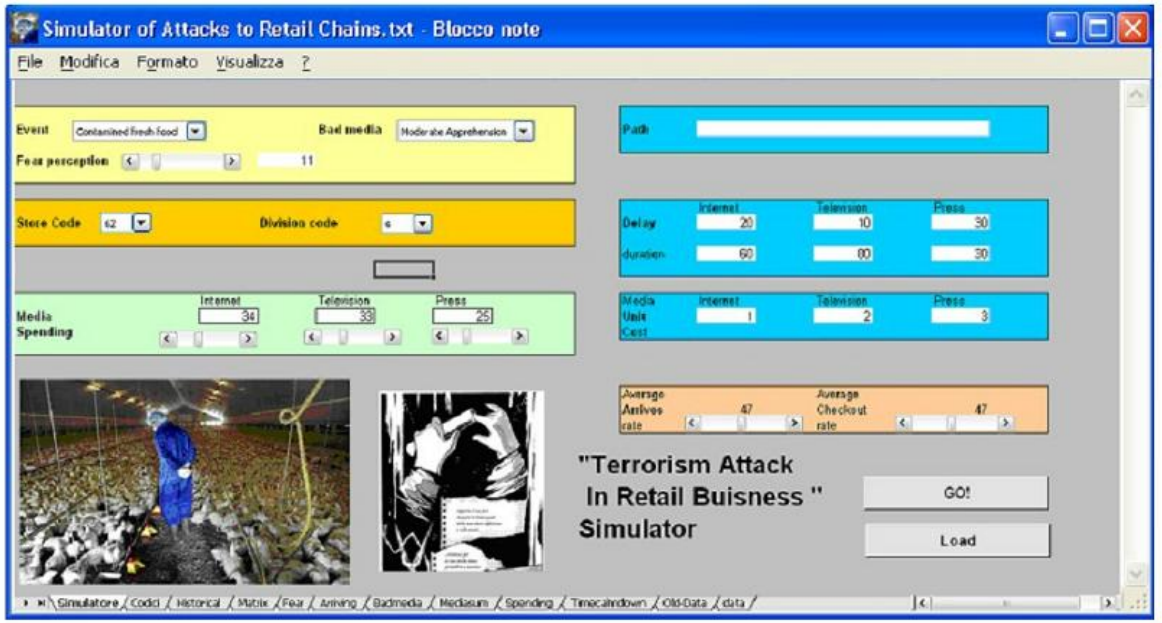
MOSCA

MO*delling Supply Chain Attacks*

MOSCA project is devoted to the development of Models for estimating the impact of attacks or disasters affecting supply chain of consumer goods; MOSCA includes dynamic impact of events on consumer emotions as well as effectiveness of countermeasures



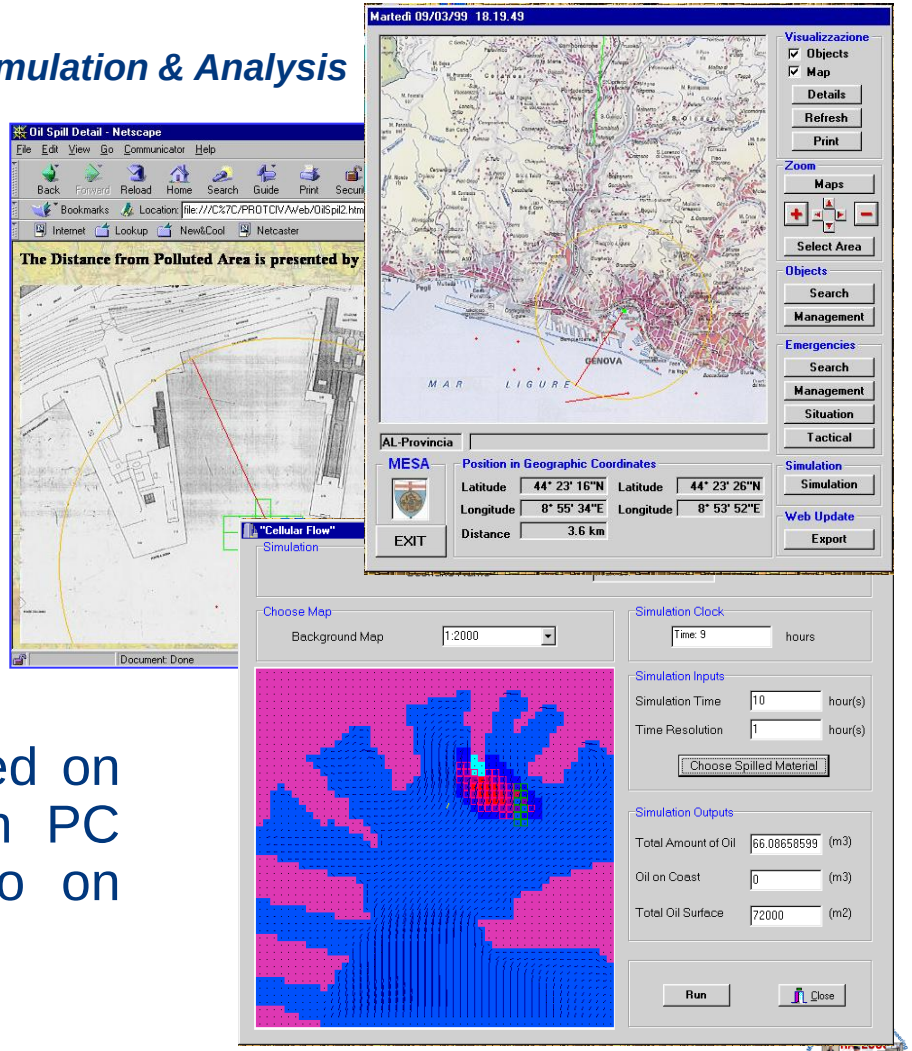




Simulation Team

MESA

Maritime Environment for Simulation & Analysis



MESA is an integrated environment to perform simulation and risk analysis in ports and maritime sector.

MESA is devoted to support port organizations, entities and operators in Emergency & Environmental Management.

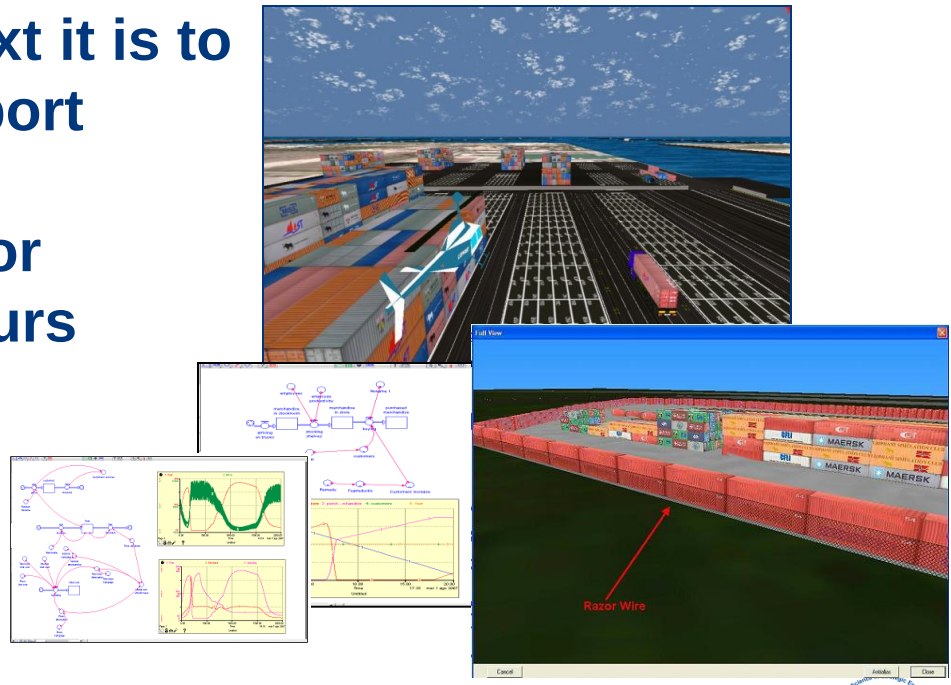
MESA is a modular system based on combined simulators running on PC and providing direct output also on WWW servers.

Simulation Team

Port/Terminal Security Simulation

Simulation Team is active in Modelling & Simulation for Guaranteeing Security in Maritime Environment especially in reference to Ports and Terminals

A major goal in this context it is to create solutions that support the Definition of operative and training procedures for security and safety harbours operations with strong emphasis on common standards and multi user framework



Simulation Team

DIME

CENTRALABS

Centro di Competenza della Sardegna sui trasporti

S4PT

Safety, Security Simulation System for Port Terminals

S4PT project was conducted to create a virtual environment able to support safety and security simulation respect port activities; S4PT allows drones and marine Assets to interoperate within distributed real time HLA federation . The simulation framework is based on Simulation Team Virtual Marine integrated with new objects for Security such as UGV (unmanned ground vehicle), USV (unmanned surface vehicle), UAV (unmanned aerial vehicle) and AUV (autonomous underwater vehicle) as well as with cameras and security units. The project was tested and completed just by MAST and University of Genoa in collaboration with MSC-LES and CentraLabs

Simulation Team

CTSim

Serious Game for Ro-Ro Operations

CTSIM is a research project developed by MSC-LES, Genoa Univ, CAL-TEK under the umbrella of Simulation Team. CTSIM can be used to train operators working in car terminals with particular attention to drivers, marshalls, quality checkers and tally men.

The CTSIM architecture is based on interoperable simulation and makes use of dedicates external hardware (i.e. motion controllers, virtual immersive helmets, wheel, pedals, etc) to provide users with the sensation to be in a real car terminals.

Multiple scenarios are available in terms of different terminal layouts (based on real existing terminals), multiple vehicles (i.e. cars, trucks, buses, etc.) and multiple types of available operators.

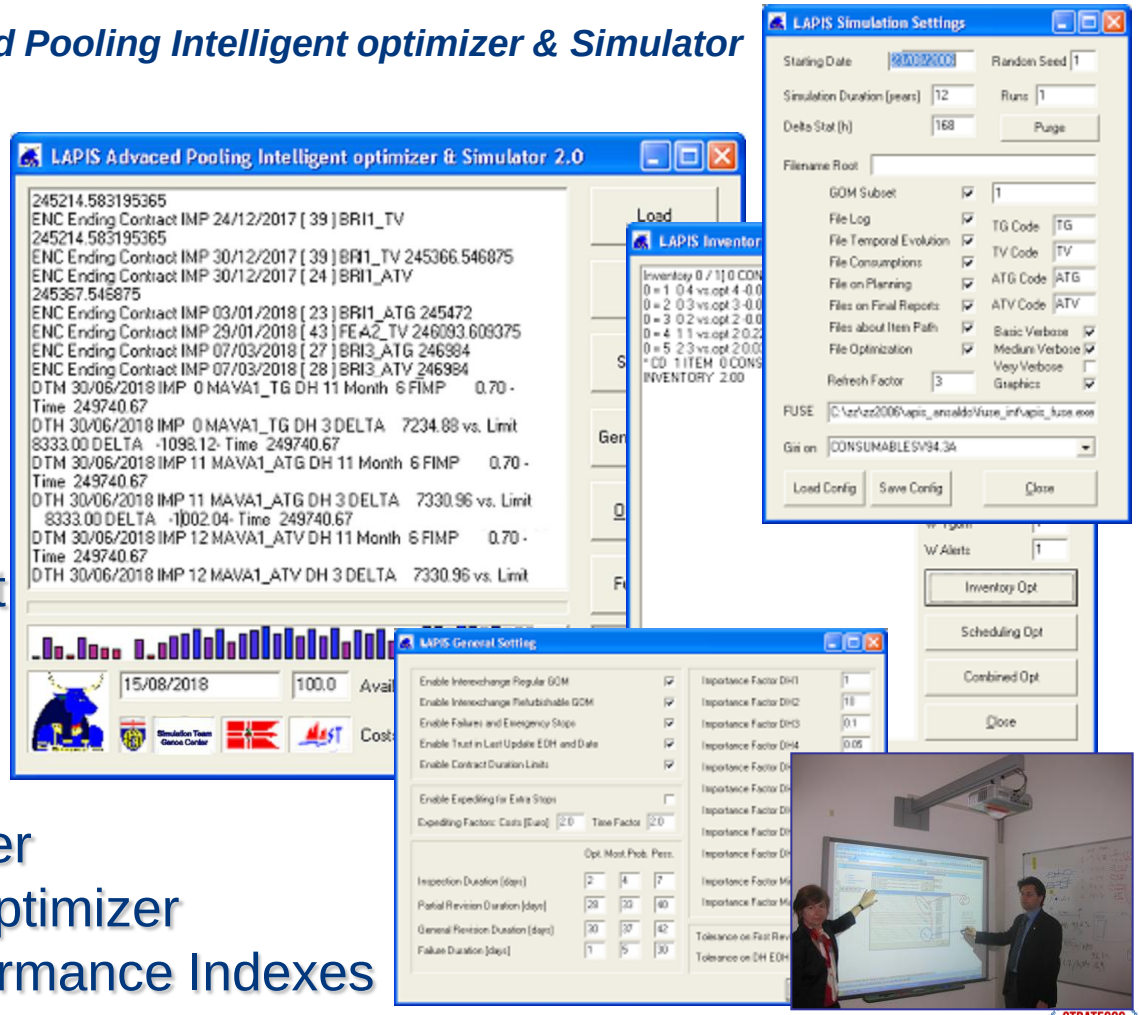
www.sim4future.com/cloud_1.html

Simulation Team

AnsaldoEnergia
A Finmeccanica Company

LAPIS

Lean Advanced Pooling Intelligent optimizer & Simulator



LAPIS is an intelligent decision support system for Service Division of Construction and Engineering Companies. LAPIS combines different modules:

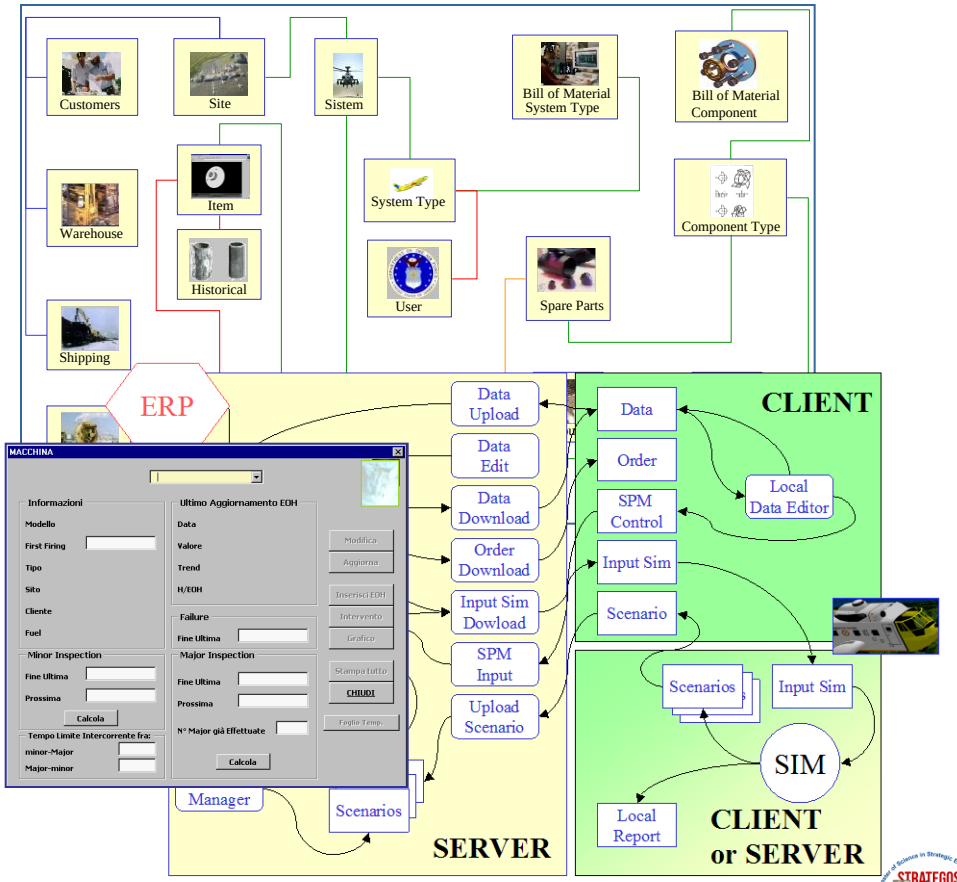
- Service Model
- Inventory Optimizer
- Scheduling Optimizer
- Overall Resource Optimizer
- Metrics & Key Performance Indexes

Simulation Team

COUGAR

Controller & Organizer for Ultimate Government of Availability and Reliability

COUGAR is the innovative system for the Service and Maintenance of complex systems (i.e. Helicopters). The system is designed to satisfy the requirements connected with the maintenance management of helicopters taking care of both pre-planned and emergency actions.



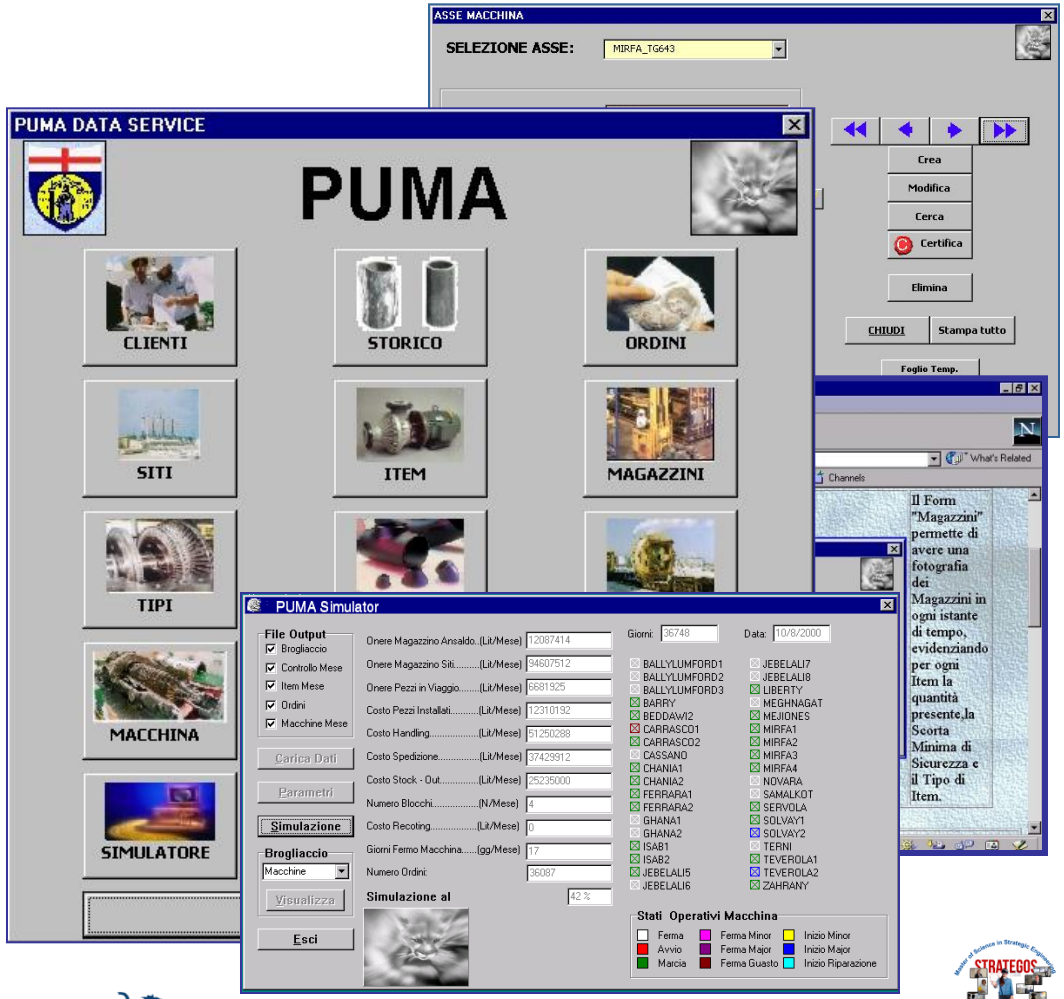
Simulation Team

ANSALDO

PUMA

Project for Ultimate MAintenance

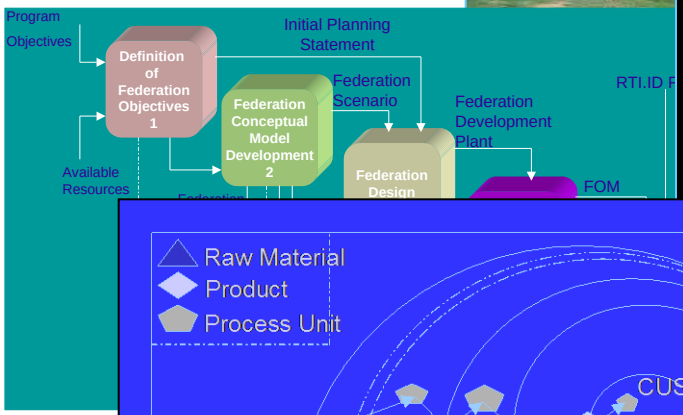
PUMA is the innovative system for re-organizing Gas Turbine Service in Ansaldo Energia.
The system allows to manage resources, spare parts, internal/external warehouses, shipping and scheduling of all the maintenance operation for over 50 power plants distributed world-wide.

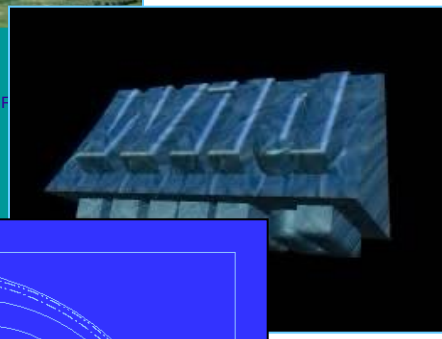


Simulation Team

WILD

Web Integrated Logistics Designer





The WILD project involves the development of a Federation composed by Simulators, Scheduling Systems and ERP.

WILD Federation reproduces the supply chain and supports on-line distributed management and control among customers, main contractors, suppliers

Simulation Team

VELA

Virtual Environment, Live systems and Augmented reality

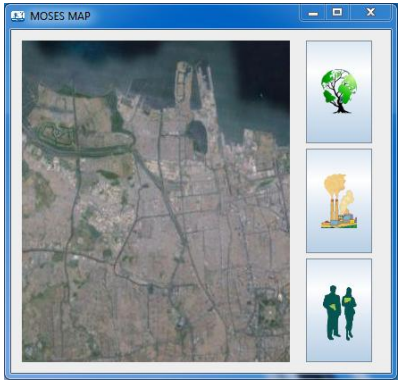
VELA, Virtual Environment, Live systems and Augmented reality, is an innovative approach that allows by using new technologies to improve Safety through Virtual Environments, Augmented Reality & Phenomena Simulation.
VELA is an approach to support:

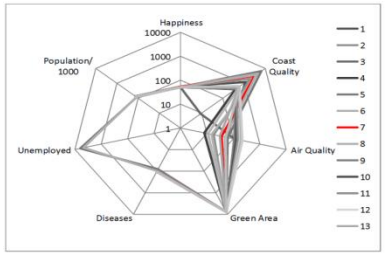
- **Safety & Security Assessment**
- **Training**
- **Operational Support**

Simulation Team

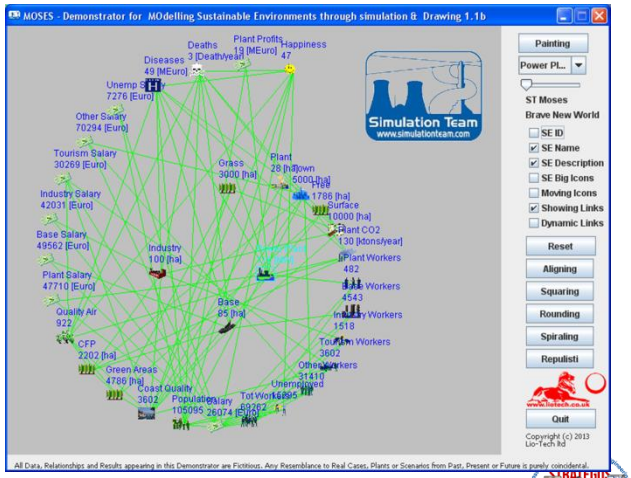
MOSES

Modelling Sustainable Environments through Simulation





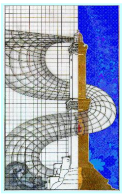
MOSES is a simulator reproducing the impact of actions over an urban environment. The refurbishment of a Power Plant, the redesign of the port and industrial activities as other actions on the area affects the Economical, Environmental and Social Sustainability. The simulator allows to analyze the interactions among many variables and it is used to support training and education. MOSES has been developed by Lio-Tech in synergy with Simulation Team, Industries and Institution in relation to the organization of interactive experiences for International Master Students and Professional Engineers working with Genoa University, Dupont, Tenova, PW etc. the Model is used within Role Play Games over confrontation between Power Plant Investors and Public Authorities in order to negotiate Industrail Offsets and conditions to finalize a sustainable and profictable solution for both sides



Simulation Team

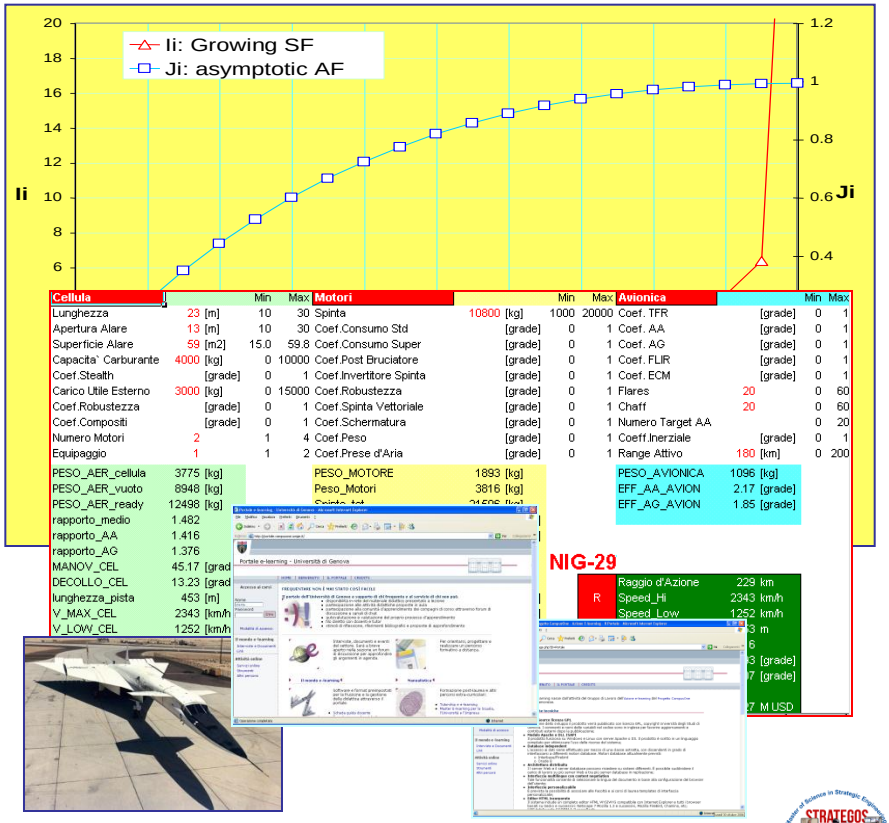
J20 Experience

E-Learning Concurrent/Cooperative Project Game



J20 allows to experience in a Web Based Environment a New Product Development by working in Cooperative Teams (Engine, Avionics Cell) representing different Joint Ventures competing for the Project a New Advanced Fighter.

The Exercise has been extensively tested in Distributed Environment for Professional and Academic Courses



Simulation Team

VOR

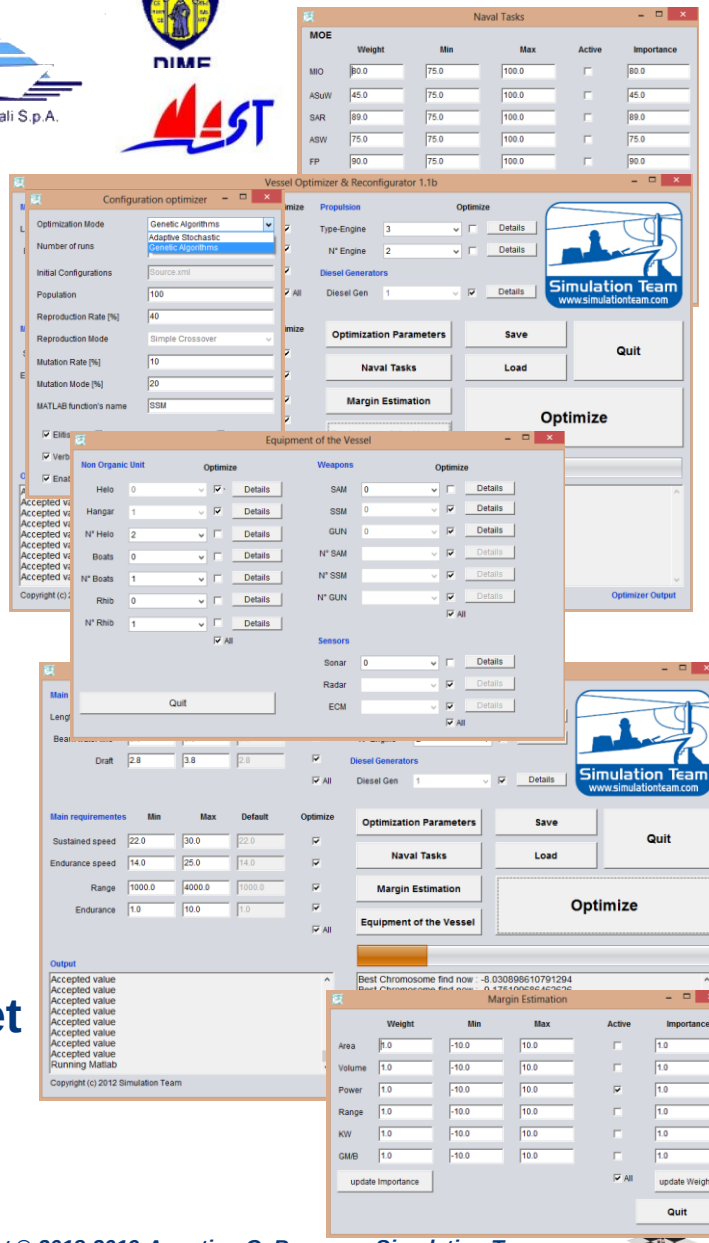
Vessel Optimizer and Reconfigurator

Orizzonte Sistemi Navali S.p.A.

DIME

MAST

VOR was developed as a smart optimizer using genetic algorithms to investigate a large number of variables in the optimization of vessel configuration. By this approach it becomes possible to optimize the ship requirements (e.g. speed, length, engine Solution, Radars, weapon systems, etc) and assets (e.g. helicopter type and number, UAV, RHIB etc.) in order to address different roles over all different marine missions.
The optimizer investigate the different Alternatives and provides solutions optimizing the Measure of Merits over all the different target Functions Including among the others Costs, Efficiency, Effectiveness, Reliability, etc.



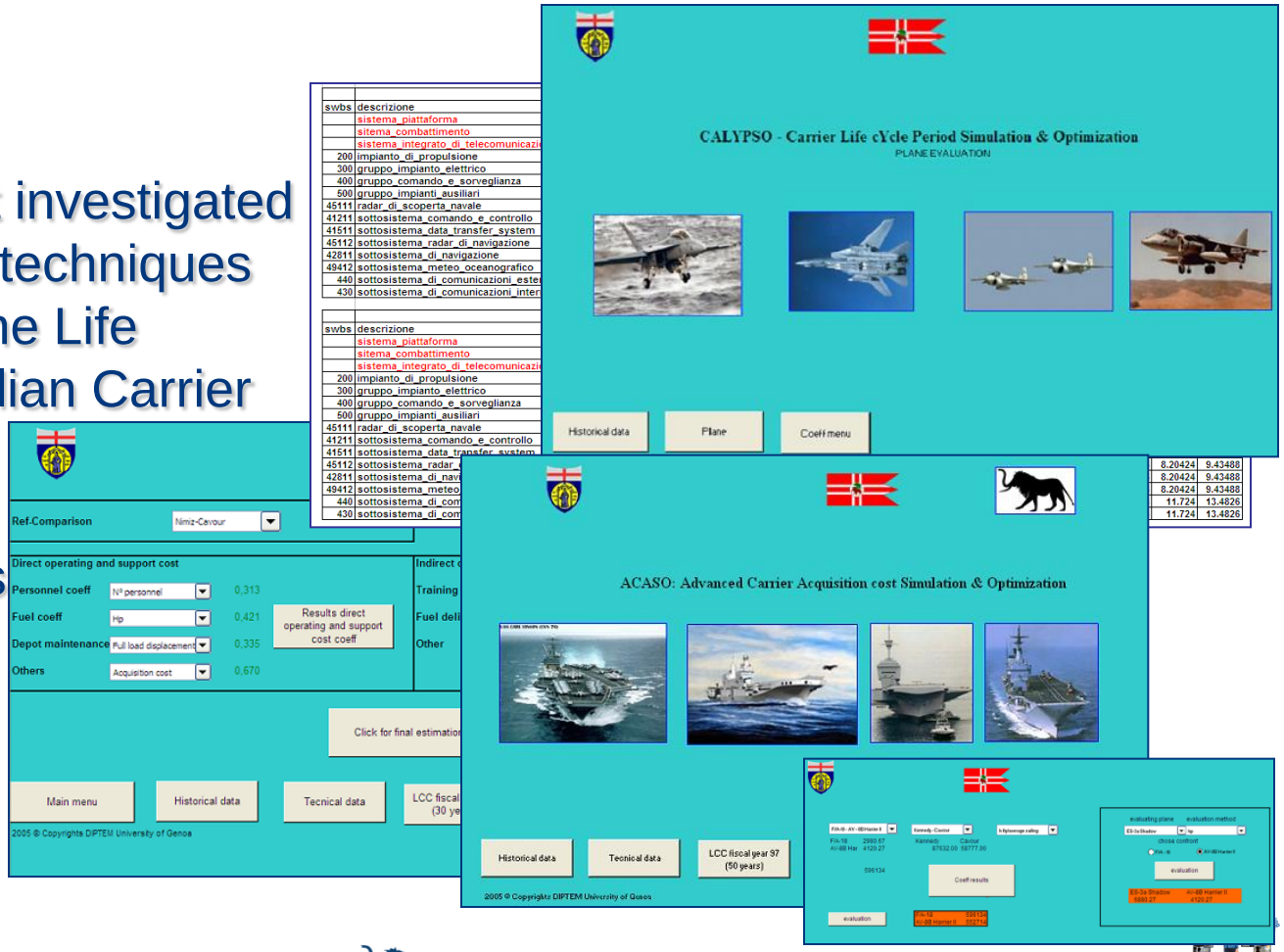
Simulation Team

CALYPSO

Carrier Life cYcle Period Simulation & Optimization

CALYPSO project investigated methodologies and techniques devoted to analyze the Life Cycle of the New Italian Carrier Cavour.

CALYPSO included development of Tools for comparing costs, operations and performances of different Carriers.

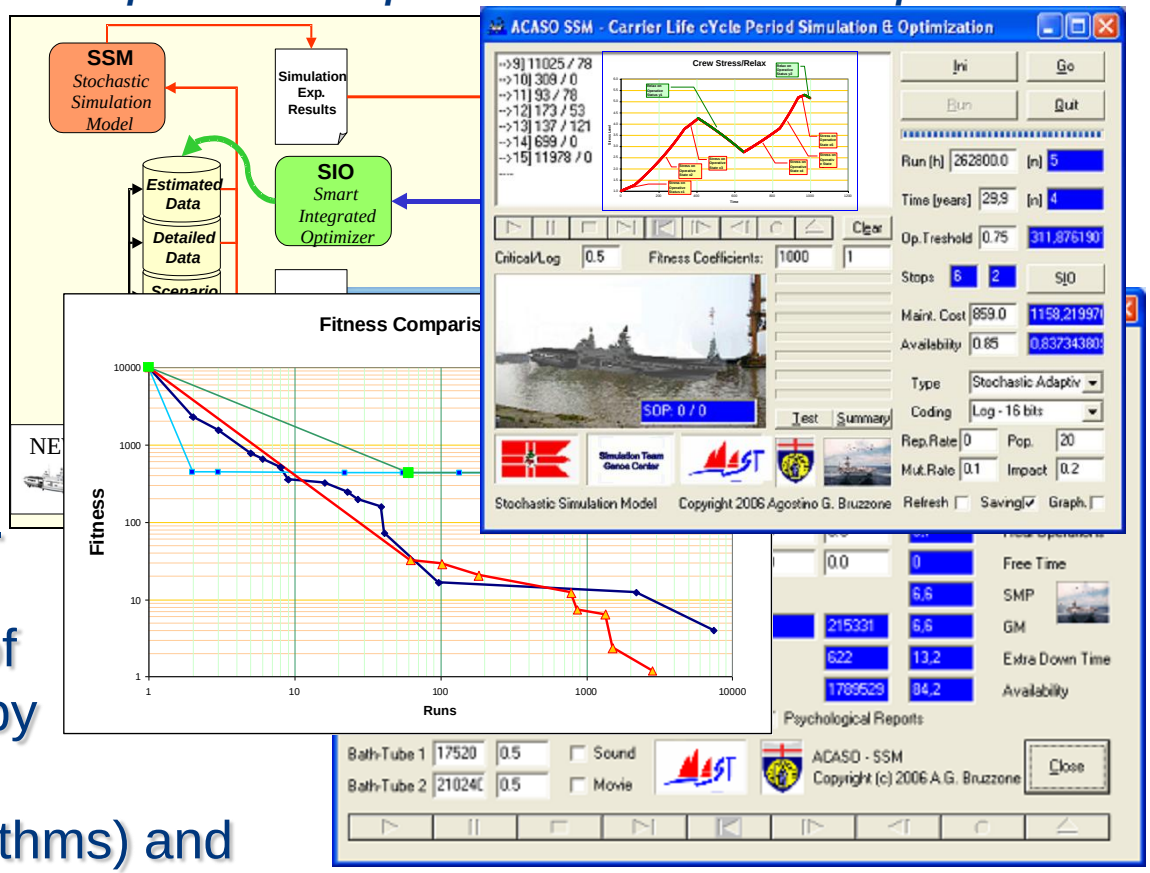


Simulation Team

ACASO

Advanced Carrier Acquisition and Operation cost Simulation & Optimization

ACASO is a system for design new Vessel by simulating their performances in relation to their operative profiles and maintenance policies. The system estimates the unknown characteristics of the new Vessel Systems by applying advanced AI techniques (genetic algorithms) and evaluating different hypotheses and scenarios



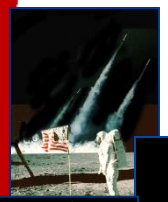
Simulation Team

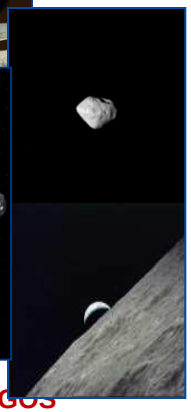
IPHITOS

Location: ***MOON***
- Latitude: 26 08’ 9.94”N
- Longitude: 3 34’40.34”E
- Elevation: -1828.8 m

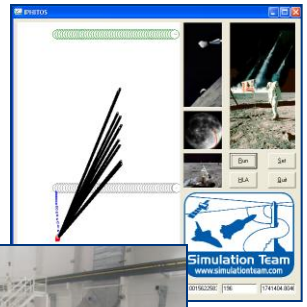
Interoperable Simulation of a Protection solution based on ligHt Interceptor Tackler operating in Outer Space

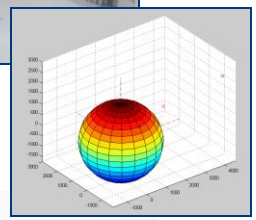
IPHITOS Project is developed by a team of students from different Universities (Genoa, La Sapienza Rome, Pisa), members of Liophant and students in internship in MBDA and support from Telespazio. This project is devoted to create a federate for Smackdown the initiative, led by NASA & sponsored by several companies,devoted to diffuse and advance the HLA culture by creating a distributed HLA Federation of a Moon Base.





IPHITOS federate is in charge of simulating small asteroids as threats for the Moon Base as well as a Safeguard Solution based on Interceptors,Sensors and Launchers



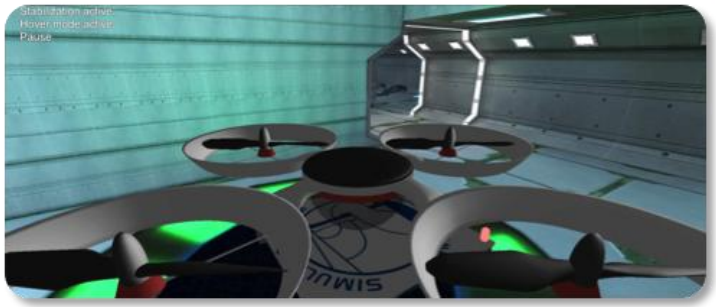


AEgis TECHNOLOGIES SISO FORWARDSIM NASA VT MÄK A company of VT Systems PITCH

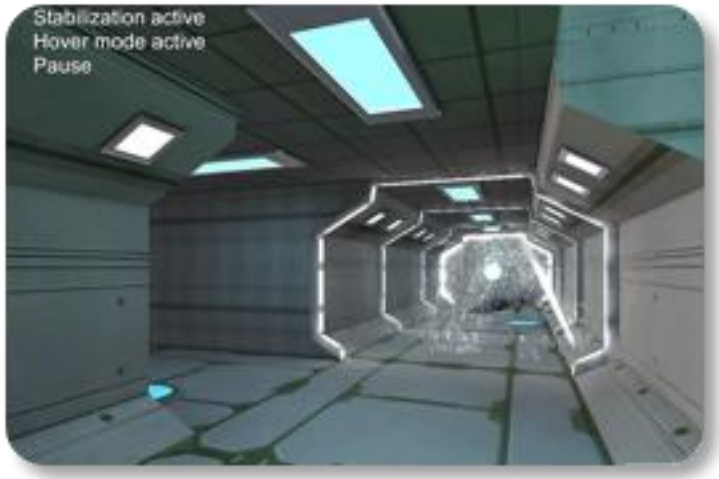
Simulation Team

DREDIS

Drones based RElief on DIsaster Simulation



The simulator proposes an innovative solution based on using autonomous systems inside the lunar base for reconnaissance and exploration missions



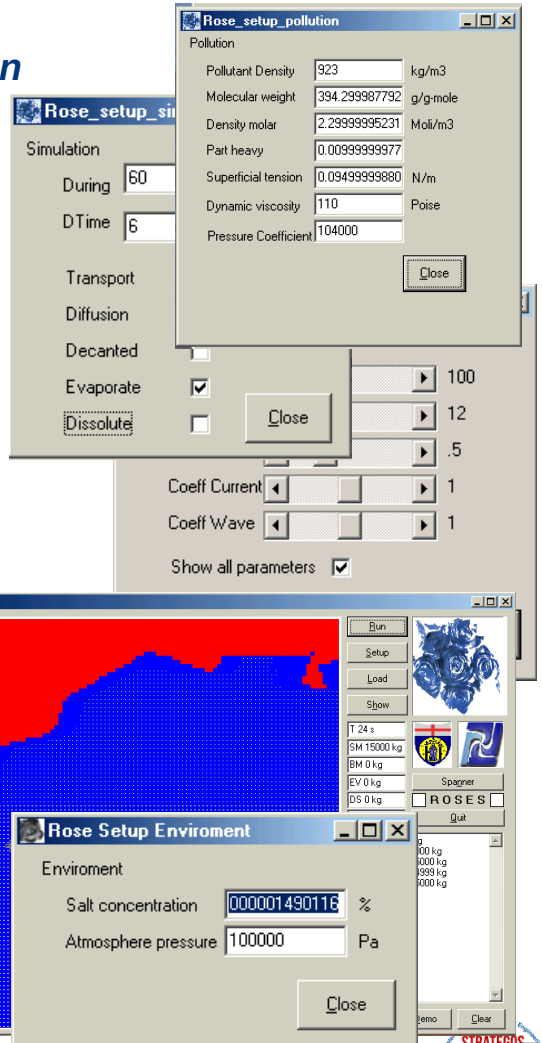
Drones are employed as lifesaving resource to increase safety for hazardous situation

Simulation Team

CETENA

ROSES

Reaction to Oil Spill Emergency and Simulation



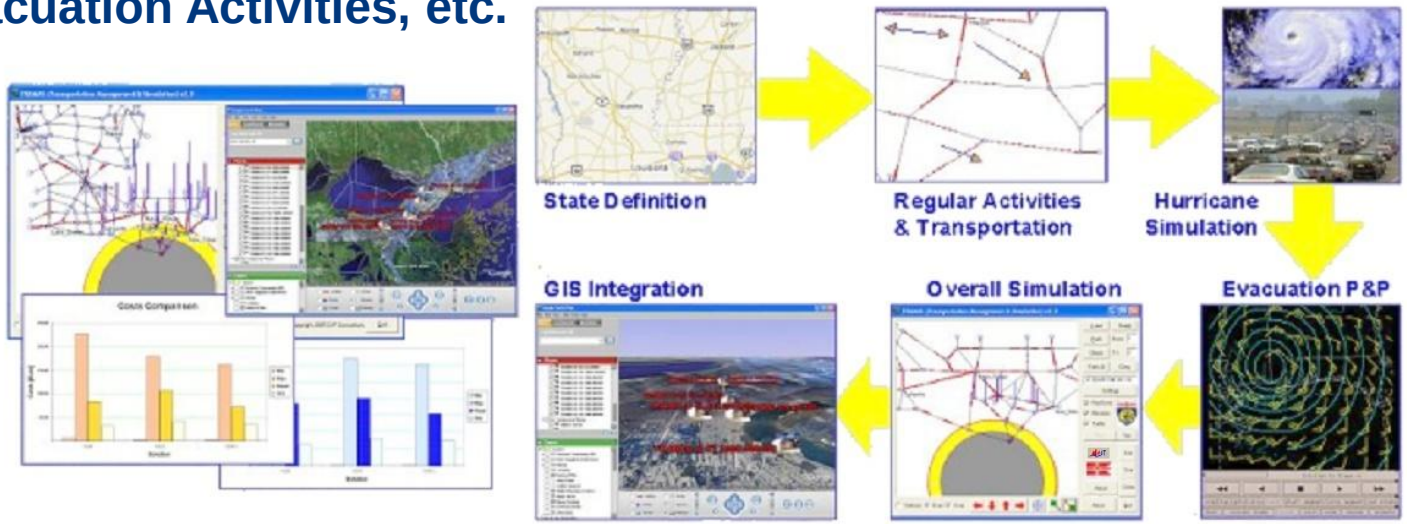
The project is devoted to create an Oil Spill Simulator for CETENA including countermeasure models.
The Simulator was validated in relation to historical data available from previous cooperations (i.e. MESA, Kuwait University,etc.) and existing databases (i.e. Istituto Idrografico Italian Navy) in order to guarantee the result fidelity.

Roses reproduces both the oil spill physical phenomena and the countermeasures actions in order to provide estimations about risks, policy effectiveness and standing operating procedures.

Simulation Team

KATRINA LIKE

KATRINA LIKE was a Joint Venture that Demonstrated the possibility to Model a National Crisis and to Simulate a Wide Emergency; the Project successful demonstrated the Simulation of an Hurricane Impact on the Transportation Layers of Louisiana State Considering Traffic Cargo, Evacuation Activities, etc.



Simulation Team

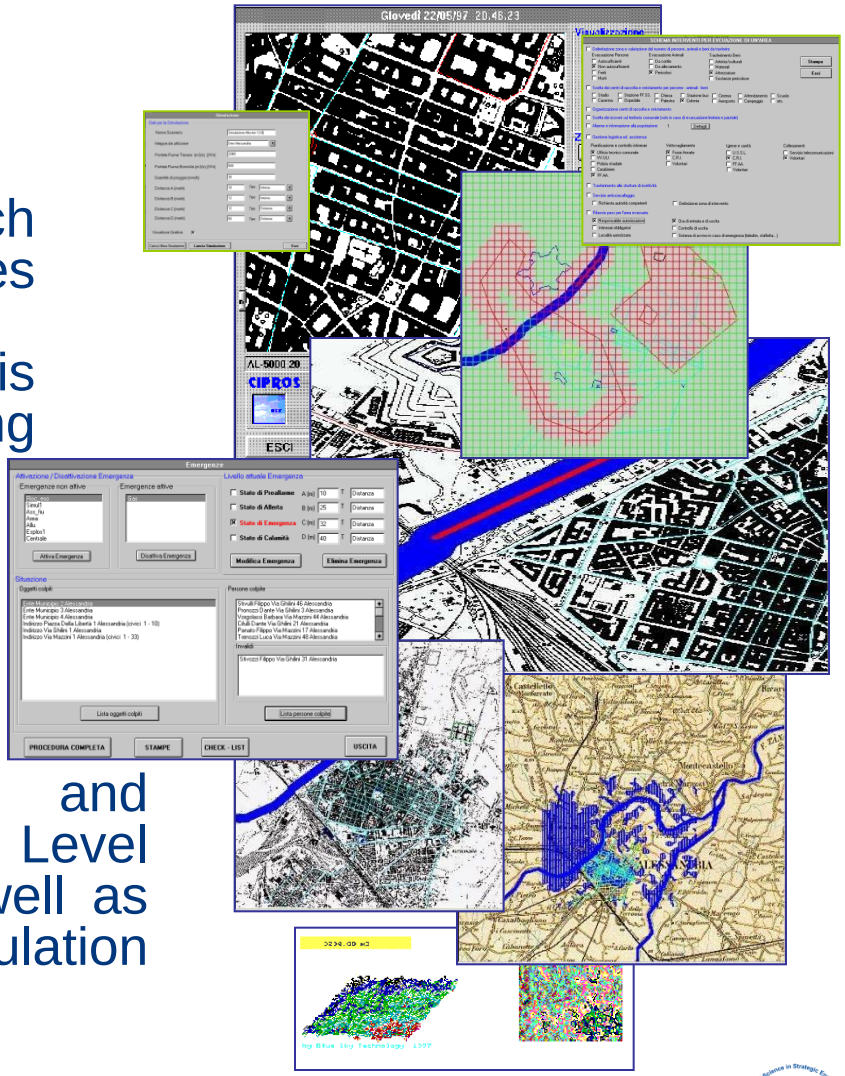
CIPROS

CIVIL Protection Simulator

CIPROS is a modular approach for Civil Protection that integrates GIS and Simulation.
CIPROS generates Crisis Dynamic Web Sites for supporting training and information share

CIPROS includes simulation of:
- Major Flooding
- Explosions
- Hazardous Material Fallout

CIPROS support definition and management of different Alert Level and Threats Classification as well as evacuation Procedures for Population and people with impediments



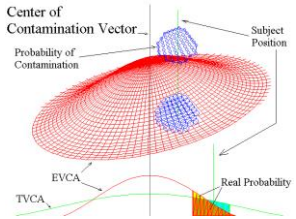
Simulation Team

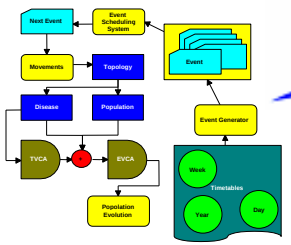
PANDORA

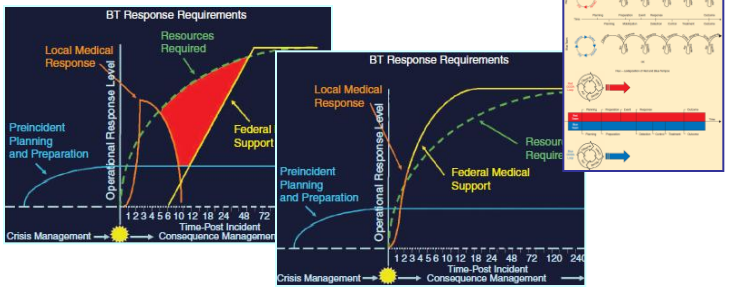
PANdemic Dynamic Objects Reactive Agents

CRiCS
CENTRE FOR RESEARCH IN COMPLEX SYSTEMS

- PANDORA addresses the dynamics of the spreading of a Pandemic and experiments are on-going on H1N1 influenza A virus by a joint simulation project involving USA, European and Australian R&D Centers (MITIM DIPTEM, Dartmouth College, CRiCS).
- PANDORA proposes to use an evidence-based approach whereby statistical data (census) and ethnographic surveys are source for the model and integrated with Human Factors representing the psychological and social parameters impact on people behaviors and their reaction to containment measures and policies
- PANDORA evaluates the efficacy and cost benefit of various mitigation strategies such as school closures, target anti-viral prophylaxis and other mitigation measures, level of absenteeism, and its impact on commerce, industry, economy and functioning of society as well as population attack rate, risks related to specific groups and on flows across State borders.



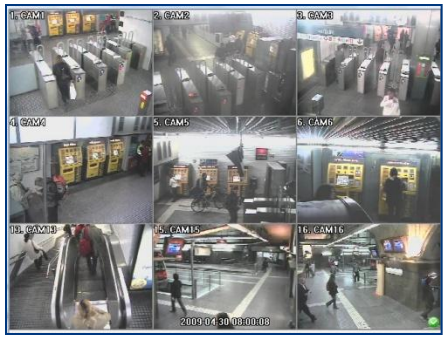




Simulation Team

PEDES

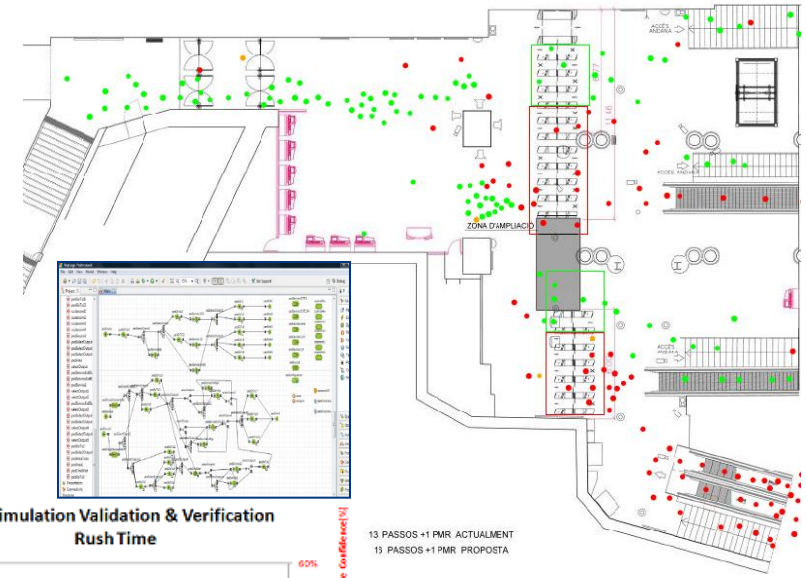
PEDEstrian Simulation

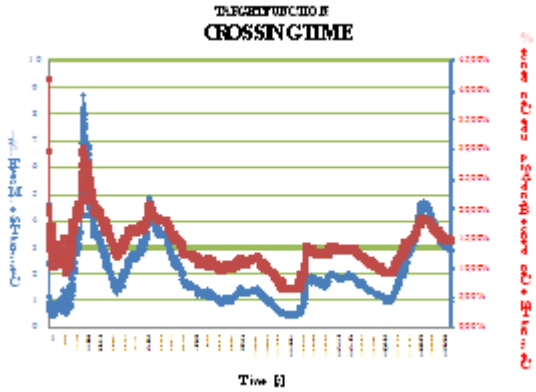


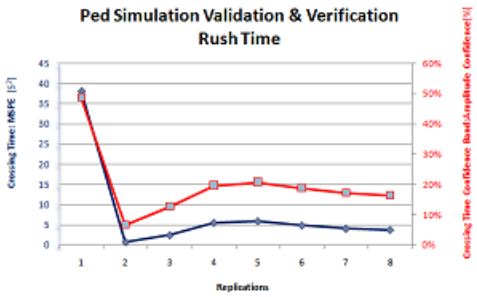
FGC Ferrocarrils de la Generalitat de Catalunya

UAB DLM

PEDES is a Simulation of pedestrian flows in mass transportation (i.e. underground) devoted to support functional analysis, safety and security solution design and analysis; PEDES is integrated with Human Behavior Models



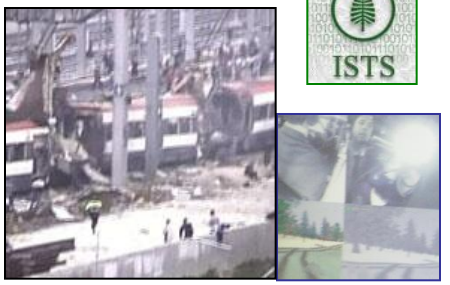




Simulation Team

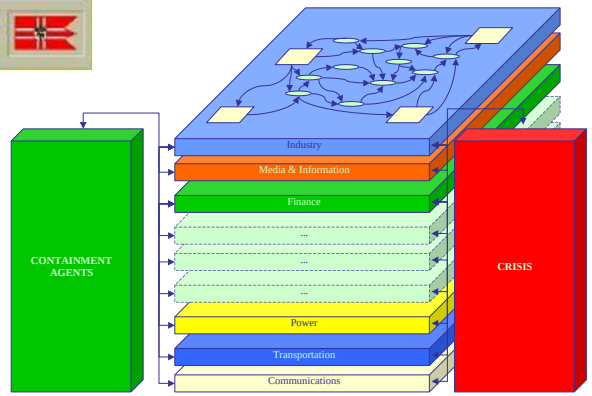
RAILSEC

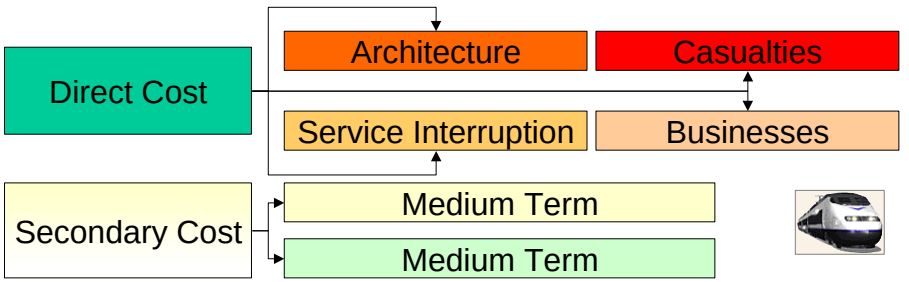
Railways Security



The project concentrated in developing models for Risk Analysis related to Security in Rail Environments. The project develop emergency management and event simulators as well as model devoted to identify medium and long term effects in term of costs, resources and impact on the overall environment.

The project was developed in cooperation with Institutes in North America and focused on terrorist attack issues



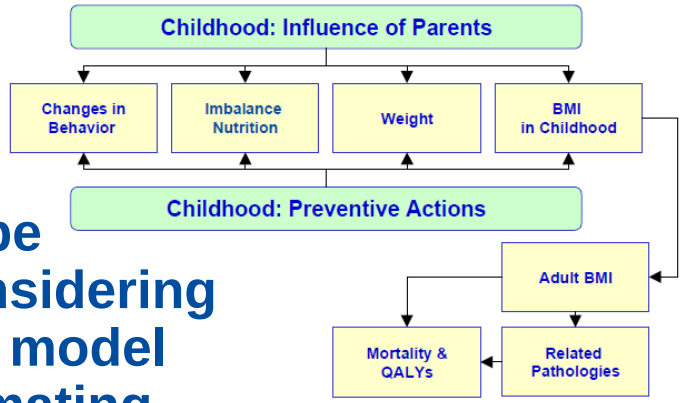


Simulation Team Genoa Center

Simulation Team

BACCUS

Behavioral Advanced Characters & Complex Systems Unified Simulator

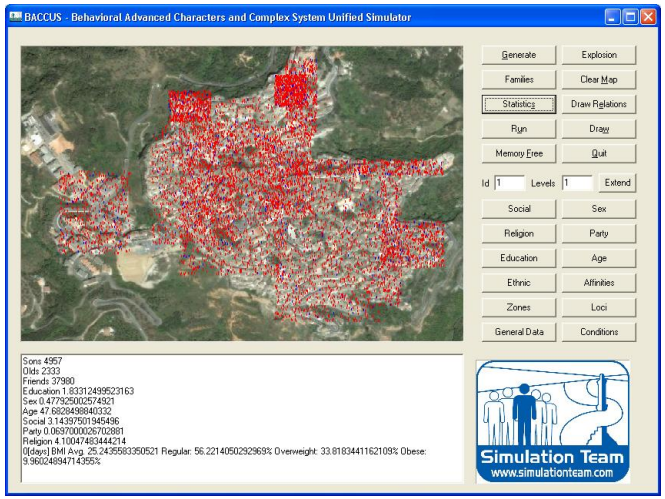


Basic Model of Obesity in Childhood

The BACCUS simulator is intended to be used to study the Obesity Epidemics considering both physiological and social aspects; the model reproduces the population dynamics, estimating correlation among different factors:

- *BMI*
- *Infarct*
- *Cancer*
- *Sport Profile*
- *Atrial Fibrillation*
- *Hyperlipidemia*
- *Stroke*
- *Diabetes*
- *Alcohol Profile*
- *Hypertension*

BACCUS simulates social networks such as Family and Friends to assess the population evolution and the mutual interaction with diffusion of pathologies



Beth Israel Deaconess Medical Center

A TEACHING HOSPITAL OF HARVARD MEDICAL SCHOOL

Simulation Team

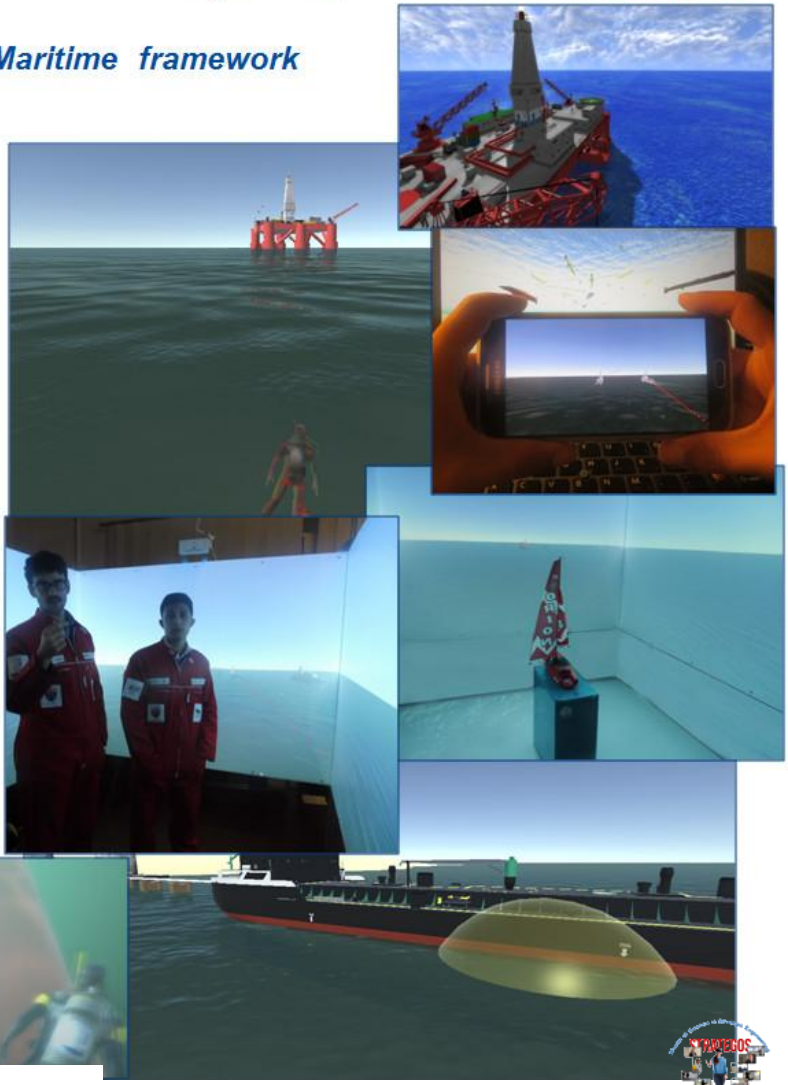
CRIPEM

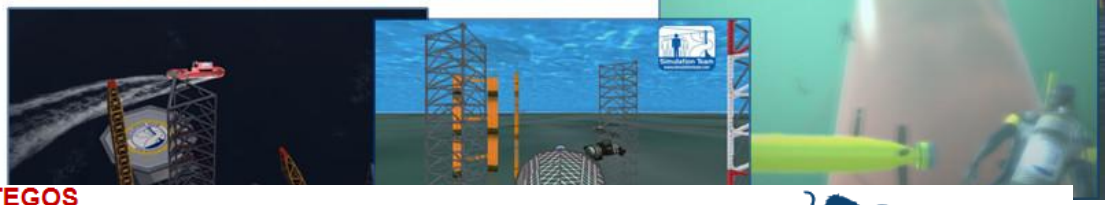
CRitical Infrastructure Protection in Extended Maritime framework

Oil Rig Protection (ORP) is a virtual MS2G (Model, interoperable simulator & Serious Game) reproducing operations devoted to protect critical infrastructure at sea from multi domain threats.

The simulator reproduces use of traditional assets as well as innovative autonomous systems in reference to different potential targets including ports, terminals and Oil Rigs.

The Simulator could be used for training, education as well as for capability assessment, vulnerability reduction and procedure definition respect a wide spectrum of threats

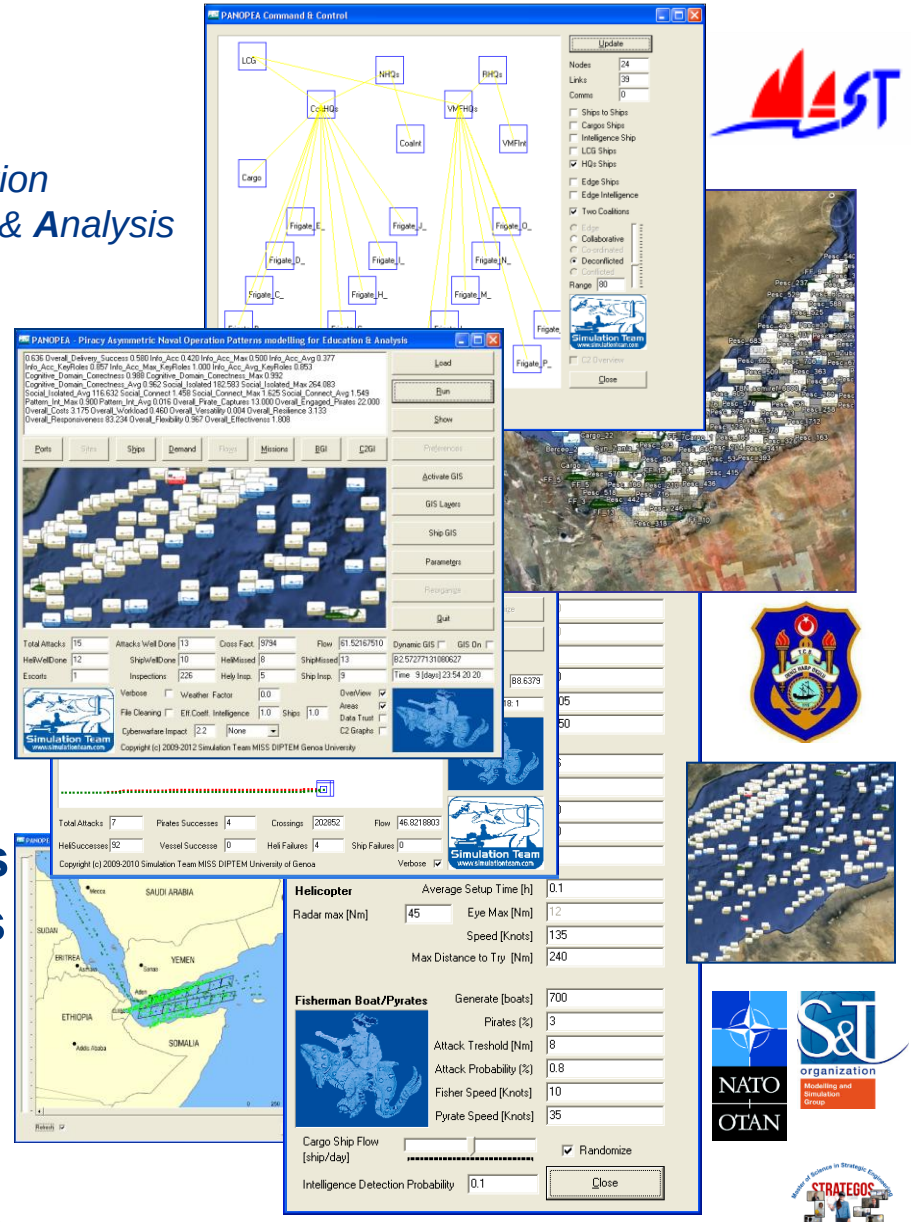




Simulation Team

PANOPEA

Piracy Asymmetric Naval Operation
Patterns modeling for Education & Analysis



- **PANOPEA is a simulator for reproduction of Piracy activities and for evaluating different strategies in NEC C2 M2 (Netcentric Command and Control Maturity Models).**
- **PANOPEA reproduces military vessels and helicopters, ground base, cargos as well as fisherman and yachts traffic as well as Pirates**
- **Pirates are directed by Intelligent Agents and apply strategies for succeeding**

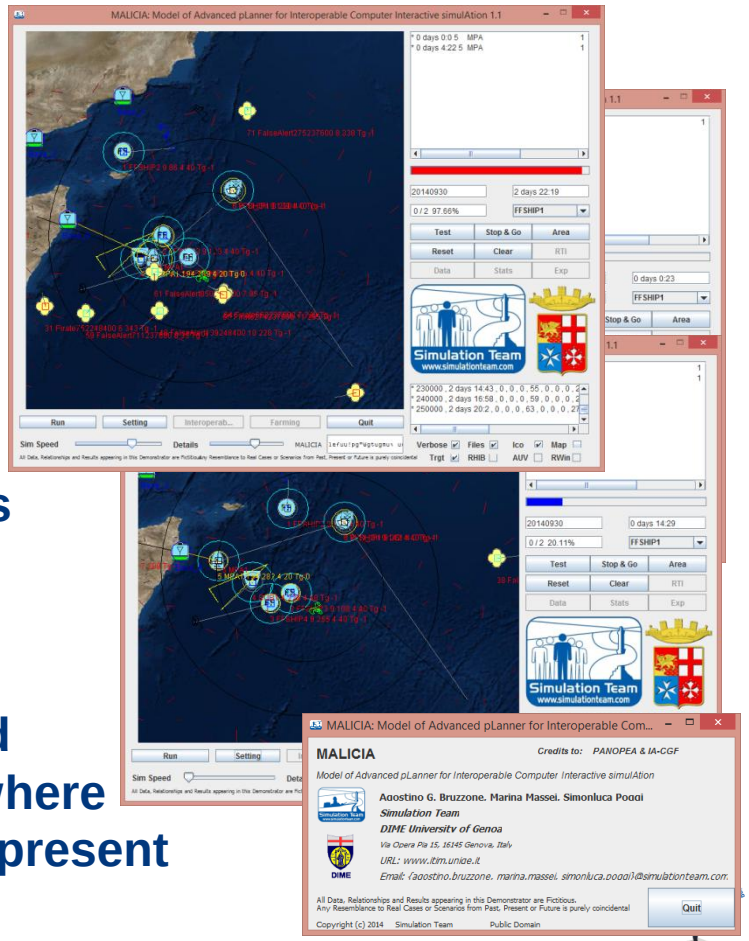
Simulation Team

MALICIA

Model of Advanced pLanner for Interoperable Computer Interactive Simulation

MALICIA is a constructive simulation derived from PANOPEA and devoted to analyze Maritime Interdiction Scenarios including anti piracy, illegal immigration patrolling and block operations.

The simulator considers boarding operations as well as inspections operating with multiple Assets (i.e. MPA, Vessels, AUV, Helicopters, RHIB, USV, AUV, Submarines). The model uses Web services to collect data and interact with Tactical Naval Situation and it is open for supporting dynamic Operational Planning and Optimization considering Efficiency, Risks and Costs of the whole aspects within scenarios where false alarms and intense commercial traffic is present

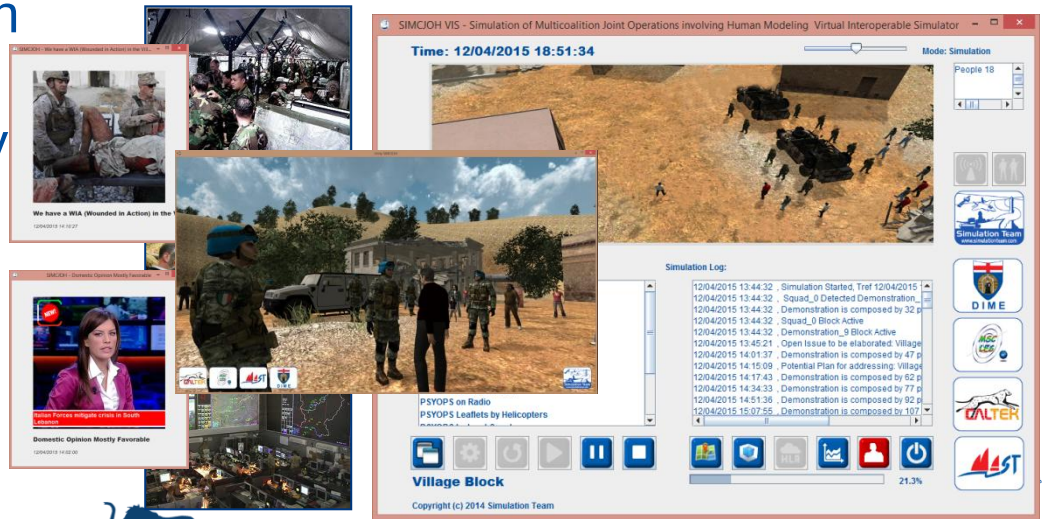


SIMCJOH VIS & VIC

Simulation of Multi Coalition Joint Operations involving Human Modeling

Virtual Interoperable Simulation & Virtual Interoperable Commander

The SIMCJOH (Simulation of Multi Coalition Joint Operations involving Human modeling) is a MS2G (Modeling & Interoperable Simulation and Serious Game) project for Strategic Decision Making. SIMCJOH project is lead by Genoa University and provides an HLA interoperable immersive framework for the Commander and his staff within critical decision making over Joint and MultiCoalitions scenarios considering the impact of human factors. The Models of Population and Human Behaviors have been developed by Simulation Team by Using IA-CGF; so SIMCJOH VIS and VIC and represent the core of SIMCJOH Federation and are available to develop even further Complex Scenarios.

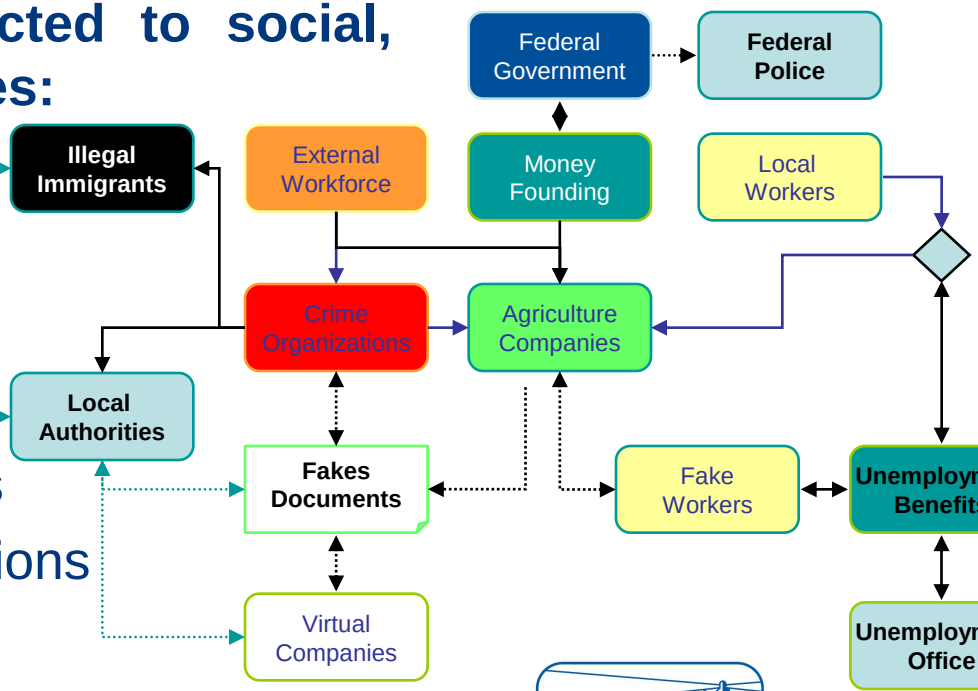


Simulation Team

INDASTRIA

This model is inspired by real case and simulate a region subjected to social, economic crisis, it includes:

- Small Region Simulation
- Social Multi Ethnic Reality
- Real & Fake Economy
- Civil Disorders
- Federal vs. Local Authorities
- Polices vs. Crime Organizations



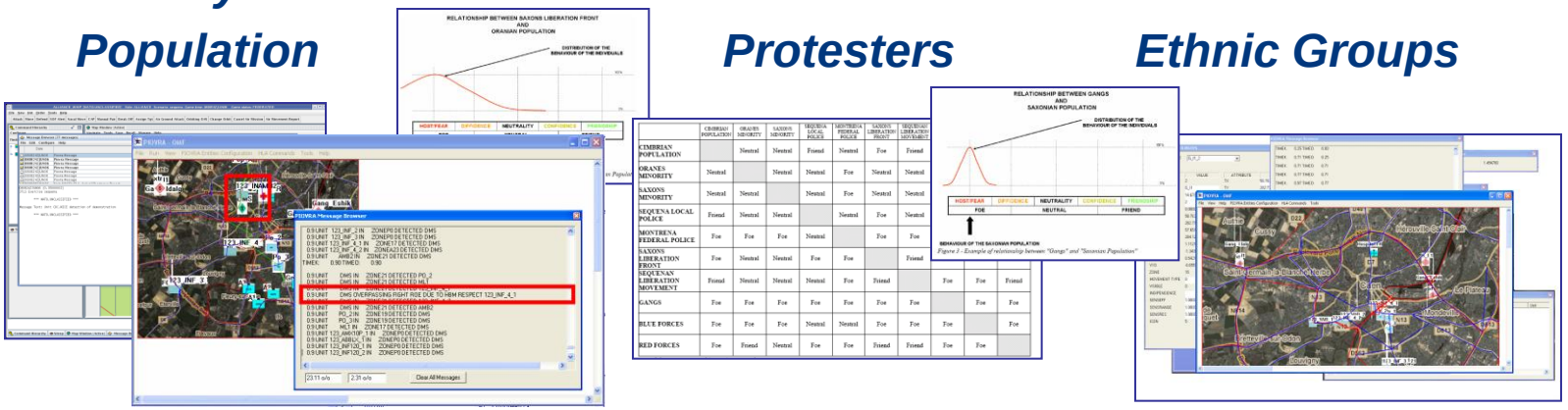
Simulation Team

RATS

Riots, Agitators & Terrorists by Simulation

RATS is a simulator based on Intelligent Agents for simulating Riots, Civil Disorders as well as Agitators and Terrorists actions within Urban Scenarios considering different entities and influence of Human Factors such as :

Paramilitary Forces	*Terrorists*	*Warlords*
Police Forces	*Firefighters*	*Health Care*
Military Units	*NGOs*	*Governmental Entities*
Population	*Protesters*	*Ethnic Groups*



Simulation Team

IA-CGF UCOIN

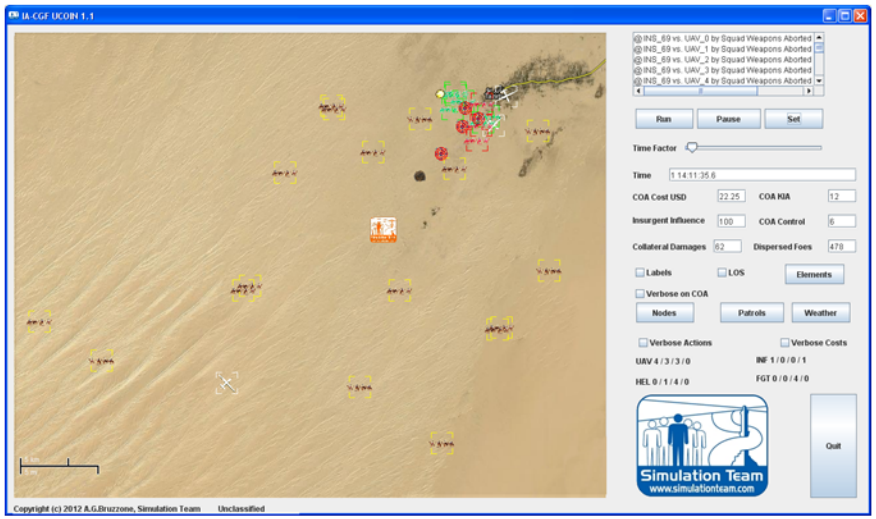
Intelligence Agent Computer Generated Forces UAV and Counter-Insurgency

www.liotech.co.uk

IA-CGF UCOIN is a Stochastic Simulator of Joint Operations involving UAV (i.e. Rapiers and Predators) for Counter Insurgency in coordination with other assets (i.e. ground units, attack helicopters, planes).

IA-CGF UCOIN allows to simulate complex scenarios where population and civilians are used to hide and shield insurgent activities and to estimate operative performance as well as collateral damages and costs.

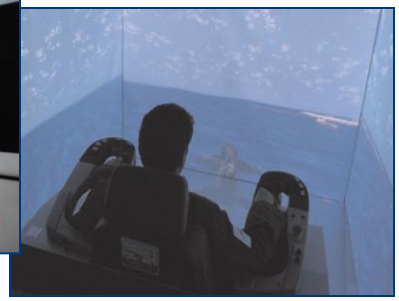
IA-CGF UCOIN is a support to evaluate technological improvements as well as new operative policies, procedures and to experiment doctrine and enemy tactics evolution.



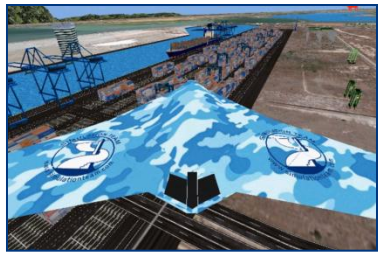
Simulation Team

ST_VIV

Simulation Team Virtual Intelligent UAV & AUV



ST_VAV is a Real-Time Agent Driven Simulation of Autonomous Vehicles that operates as swarms and to test Virtual Manned Drone Concept within an HLA Federation (ST_VP Federation). This Synthetic Environment supports different types of UAV (i.e. Predator, Reaper and UACV) and AUV (autonomous underwater vehicle) such as sea gliders. Currently ST_VAV allows to manage different swarms of UAV (i.e. 12 Unmanned Aerial Vehicles) flying as a wing controlled by a Intelligent Agents or directed by an Operator immersed in the Simulation Team CAVE (Covering 270° Horizontal and 120° Vertical, 6 DOF and/or 3 DOF Motion Platform, 3D Stereo Surroundings) integrated with Biometric Devices (i.e. eye flickering, eye tracking, cardio frequency, muscular tone).



www.liotech.co.uk

Simulation Team
www.simulationteam.com

Simulation Team

IA-CGF MODULES

The new *IA-CGF* Modules devoted to create the simulation of complex Scenarios include:

- ***IA-CGF Units***
- ***IA-CGF Human Behaviors***
- ***IA-CGF Non-Conventional Frameworks***

Simulation Team

IA-CGF Units

***IA-CGF Units* are a set of interoperable units with capability to be integrated in constructive simulation**

- Police
- Gangs
- Local Population
- Rioters
- Insurgents
- Terrorist
- Local Authorities
- Warlord
- Criminal Organizations
- NGOs (CIMIC ops.)
- Civil Personnel (CIMIC ops.)
- Domestic/National Situation (for instance for troops moral):
  - Population
  - Media
  - Lobbies
- International Public Opinion
- International Diplomacy
- New Threats (i.e. 2nd Generation Terrorists)

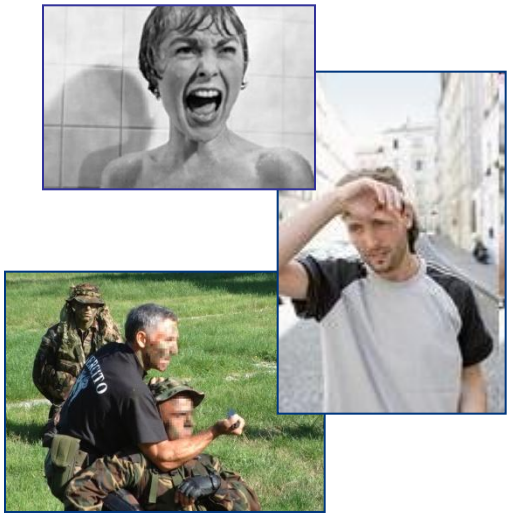
These are examples of non-conventional units controlled by IA-CGF

Simulation Team

IA-CGF Human Behaviors

Specific modules with *IA-CGF Human Behaviors*:

- Fear
- Stress
- Fatigue
- Training Level
- Aggressiveness
- Ethnic Factors
- Religious Factors
- Combat Skills/Experience



IA-CGF Human Behaviors operate as a set of further characteristics to be added to each unit in constructive simulation.

i.e. now in constructive simulation every unit in the scenario have infos about status and type of ammo, by IA-CGF it will be added dynamic information about level of fear and stress and the Units performing according to it

Simulation Team

IA-CGF Non-Conventional Frameworks

It is important to consider the integration in a scenario of the *IA-CGF-Non-Conventional Frameworks (IA-CGF-NCF)*, each simulating specific events:

- *IA-CGF CIMIC/HUMANITARIAN FRAMEWORKS*
  - Food Distribution
  - Reconstruction

- *IA-CGF Homeland Security and Civil Protection FRAMEWORKS*
  - Natural Disaster (i.e. Hurricanes, Earthquakes)
  - Man Made Disasters (i.e. Explosion, Hazardous Material Spills)
  - Evacuation
- *IA-CGF PSYOPS and INTELLIGENCE FRAMEWORKS*
  - Integration *Sibilla*© Serious Game for Intelligence Officers training

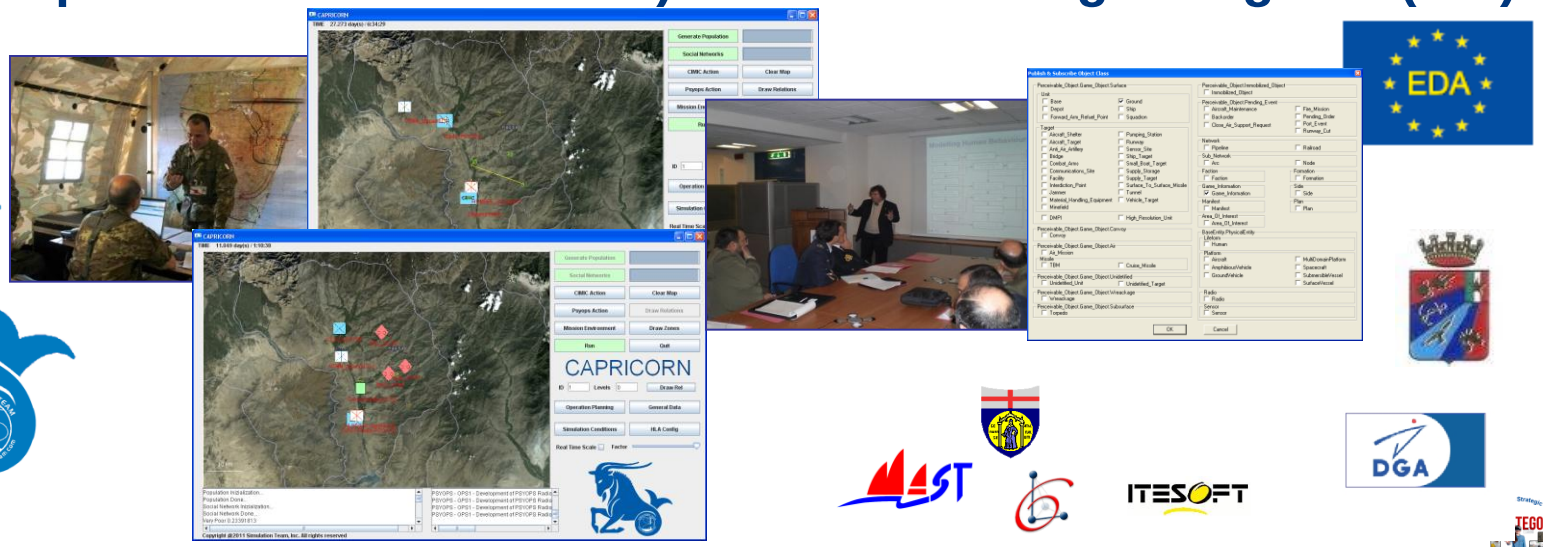
In non conventional scenarios for particular training purposes.
We can imagine to have active different non conventional Frameworks, in different locations, with different level of detail inside the simulated theater.

Simulation Team

CAPRICORN

Civil Military Co-operation And Planning Research in Complex Operational Realistic Network

- **CAPRICORN is an innovative EDA R&D Project devoted to develop capabilities in the complex and critical sector of Military Operation Planning, specifically for asymmetric warfare scenarios involving CIMIC and PSYOPS, by using CGF (Computer Generated Forces) based on Intelligent Agents (IAs)**



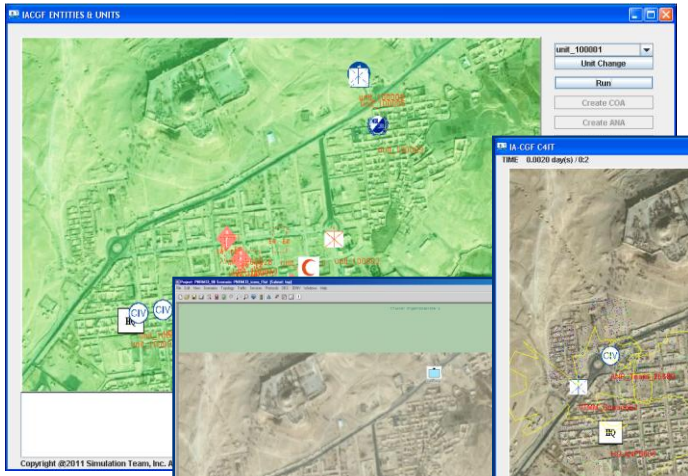
Simulation Team

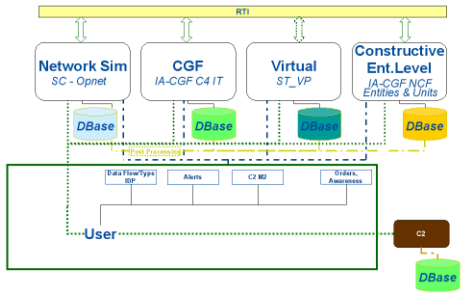
CeSiVa

CGF C4 IT

Computer Generated Forces C4 for Italian Army

CGF C4 IT allows to measure the effectiveness of different C2 Maturity Models involving local and coalition forces, police and other resources in an foreign urban framework. This Federation is based on use of IA-CGF and SC and is devoted to support Italian Army Simulation in term of experimentation and analysis of technologies and policies





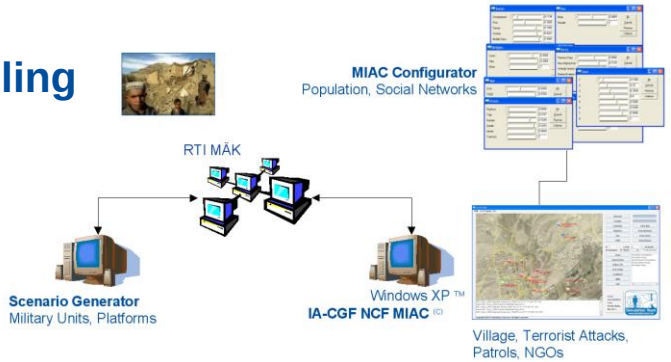
Simulation Team

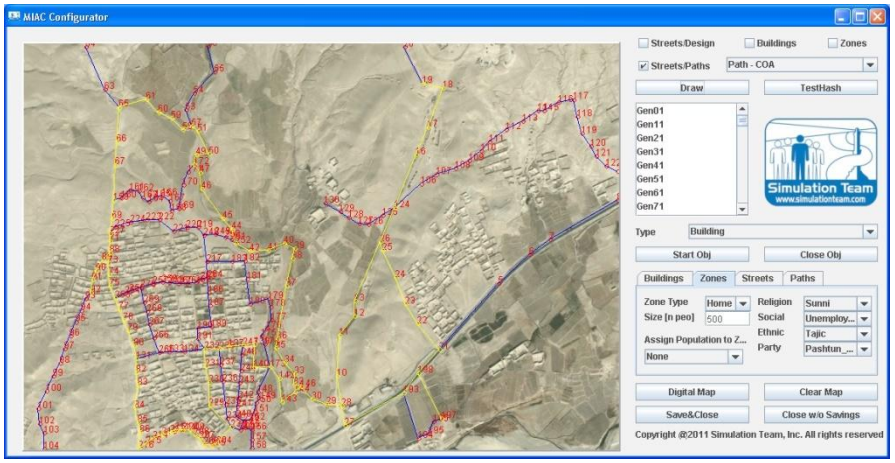
SELEX Sistemi Integrati
A Finmeccanica Company

MIAC

Models of Intelligent Agents for Computer Generated Forces

MIAC NCF and MIAC Configurator are designed to drive a Federation where the IA-CGF allows to reproduce population within an Afghan Village. MIAC Federation is designed to operate under HLA using RTI MÄK on Workstations using Windows XP™ O.S. and installing IA-CGF NCF MIAC© derived by IA-CGF NCF PSYSOP© MIAC is interoperable with other federates (i.e. Scenario Generators) while the MIAC Configurator supports the Scenario Definition





Simulation Team

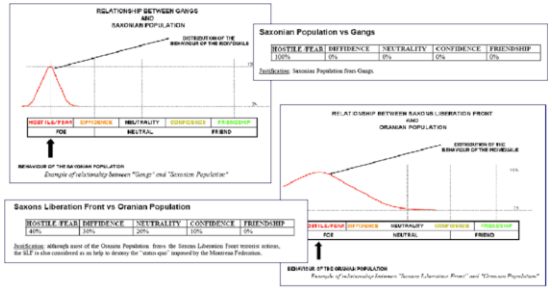
PIOVRA

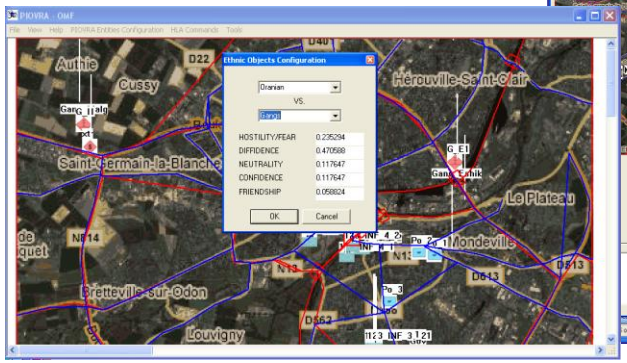
Polyfunctional Intelligent Operational Virtual Reality Agents

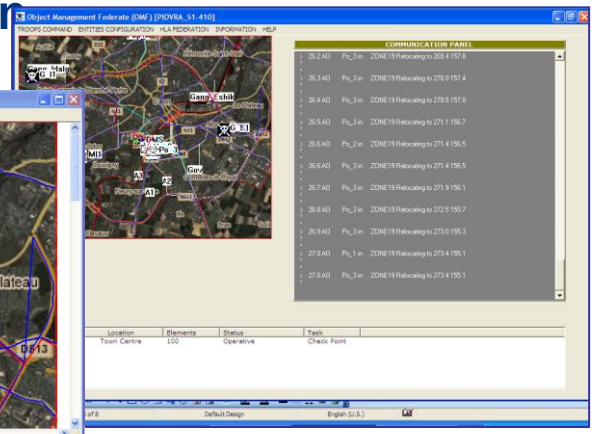
PIOVRA was an EDA Project developed in cooperation with Italian and French MoDs in partnership between MITIM DIPTEM & LSIS.

PIOVRA allowed to develop a new Generation of CGF able to simulate "Intelligent" behaviors, filling up the gap between user requirements and current available CGF performances

PIOVRA demonstrated the new intelligent agents directing the CGF as effective models integrated in HLA Simulation reproducing Urban Disorders integrated in a Theater Simulation



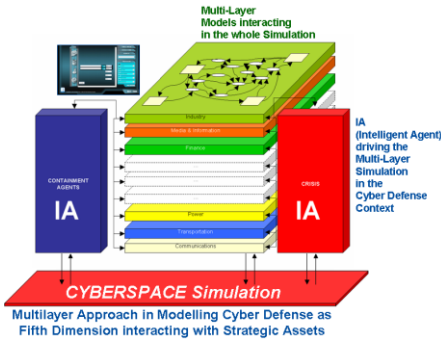




CRYSTAL

Cyber Reality Simulation for Threat Assessment and Defense Learning

The CRYSTAL is a research coordinated by Genoa University. CRYSTAL Goals is to develop a simulation framework able to simulate Cyber Defense scenarios related to the Different Layers representing Strategic National Assets (i.e. energy, communication, finance, transportation); CRYSTAL is a modern interoperable architecture allowing a modular approach aimed at advancing the research in a Cyber Defense by using a federation of interoperable stochastic simulators driven by IA-CGF (Intelligent Agents Computer Generated Forces).



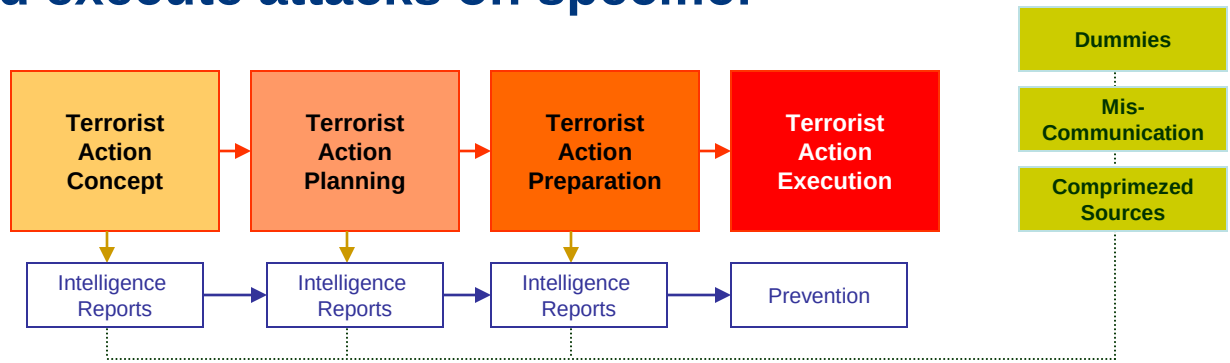
Multilayer Approach in Modelling Cyber Defense as Fifth Dimension interacting with Strategic Assets

Simulation Team

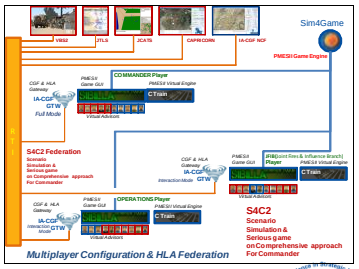
SIBILLA

Simulation of an Intelligence Board for Interactive Learning and Lofty Achievements

- **SIBILLA is multiplayer web strategy game that simulate Terrorist Actions organized by different organization directed by IA that plan, prepare and execute attacks on specific:**
  - **Location**
  - **Site**
  - **Time**
  - **Threat Type**



- **The intelligence reports are distributed among the players based on their capabilities and shared by a stochastic engine**
- **The Identification of the attacks in time is the key for individual success; the players cooperate and compete for budget and success**
- **Threat missed to be identified generate terrorist attacks that reduce global trust and support to intelligence agencies**



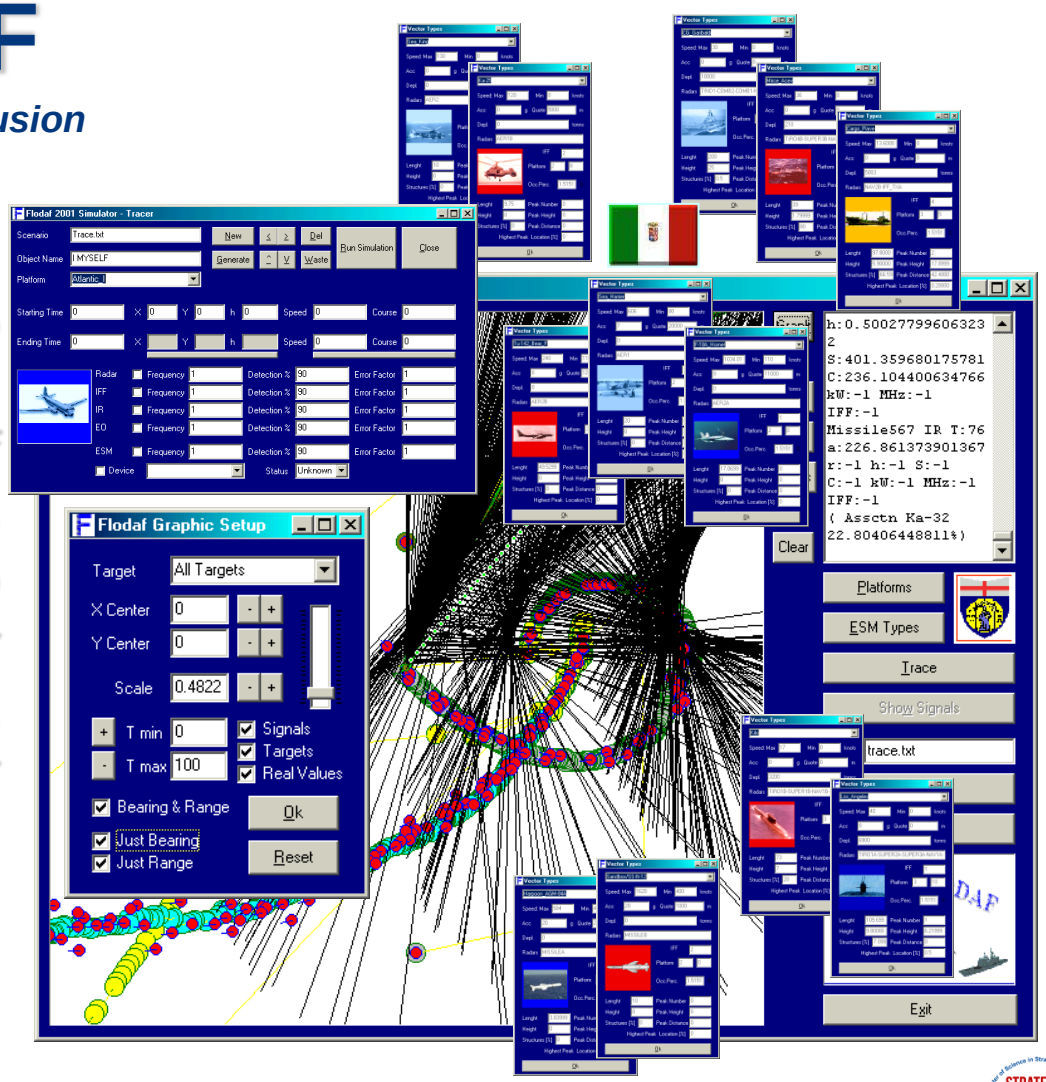
Multiplayer Configuration & HLA Federation

Simulation Team

FLODAF

Fuzzy Logic Data Fusion

FLODAF is an tools to support engineering and performance estimation of Data Fusion Solution; this suite includes a Scenario Generator and a Simulator for analyzing the Data Fusion performances over complex Air-Naval scenarios including ships, submarines, missiles, airplanes and helicopters.



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References

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