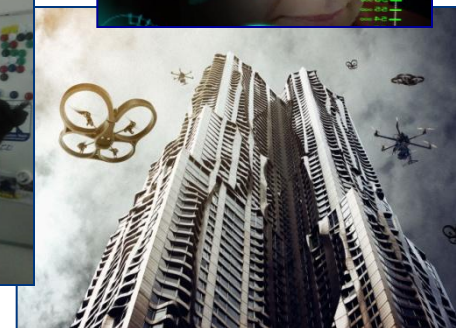
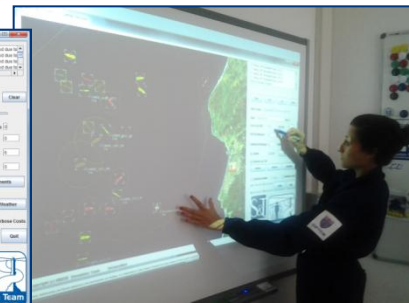
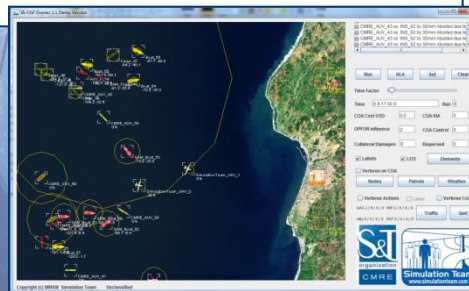




# Experimentation, Science & Technology Organization : Simulation as Strategic Technology for Coalition Force Initiative (CFI)

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*DIME Genoa University*  
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# Connected Forces Initiative

## CFI

CFI is expected to provide for Allies an alternative to the operational focus of the last decade by guarantee capabilities through NATO “communication, practise and validation” CFI is a major part of Allied efforts to achieve NATO Forces 2020 and it represents an Alliance-wide, enduring, programme providing a philosophy, focus and mechanism through which to enhance and sustain NATO’s military preparedness and operational edge in an age of uncertainty.

CFI is postulated as a series of interlinked activities involving education and training, including Exercises, Forces and Technologies.



In CFI the coherent education and training will offer the bedrock for the development of individuals and teams so they have the cognitive ability to assimilate and understand complex situations, people and cultures and are comfortable with ambiguity and risk. Relevant and forward looking NATO doctrine and common procedures will enhance interoperability. CFI activities in testing and evaluation over NATO Commands and Forces within challenging exercises will support improvement and sustainment of the very high level of skill and interoperability necessary for campaigning in the 21st Century in joint multinational contexts

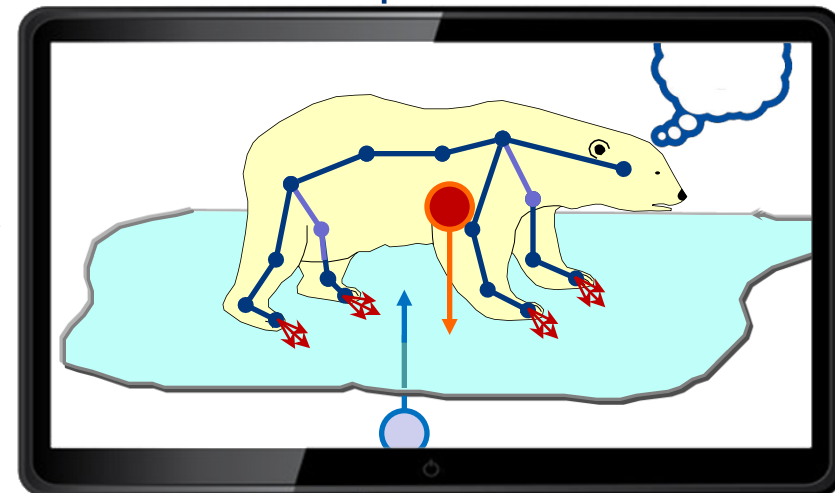
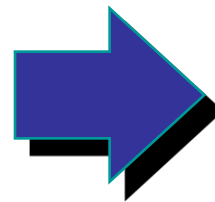


# What are M&S, SG & HBM?

**Simulation** is the reproduction of the reality by using computer models. The Simulation allows to build up a **Virtual Environment** and to run dynamic scenarios in order to analyze or optimize the real system. A **Serious Games** allows to involve players in an learning experience through user Engagement .



**HBM** means **Human Behavior Modeling** and/or Human Behavior Modifiers that are used for simulating the human components





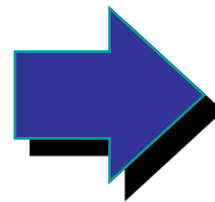


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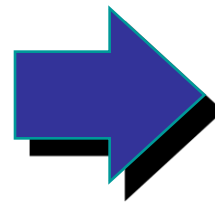


# What are M&S, SG & HBM? Hot Bear Modeling... No, but...

If we move from the technological and physical plan to operation and interaction the modeling, **Behavior** become crucial.

In case of interest into modeling Bear Activities over the ice, it emerge the fundamental need to reproduce social interactions and emotions that affect their behaviors.

In this case the fear of the Bear Cub, the Leadership of the Mother and their collective action should be model.





# Dealing with Evolution and Change

**Simulation could create Virtual World where to learn how to Master the Technologies, the Mission Environments in new emerging Domains**





# Future proposes New Challenges and Risks

**Simulation is an Enabler to Learn how to face Risks in new challenging Environments where Experience is not available or usable**







# Innovation & ...Organization Inertia



**How Many Years to evolve Plane Signs... more than 15!!!**





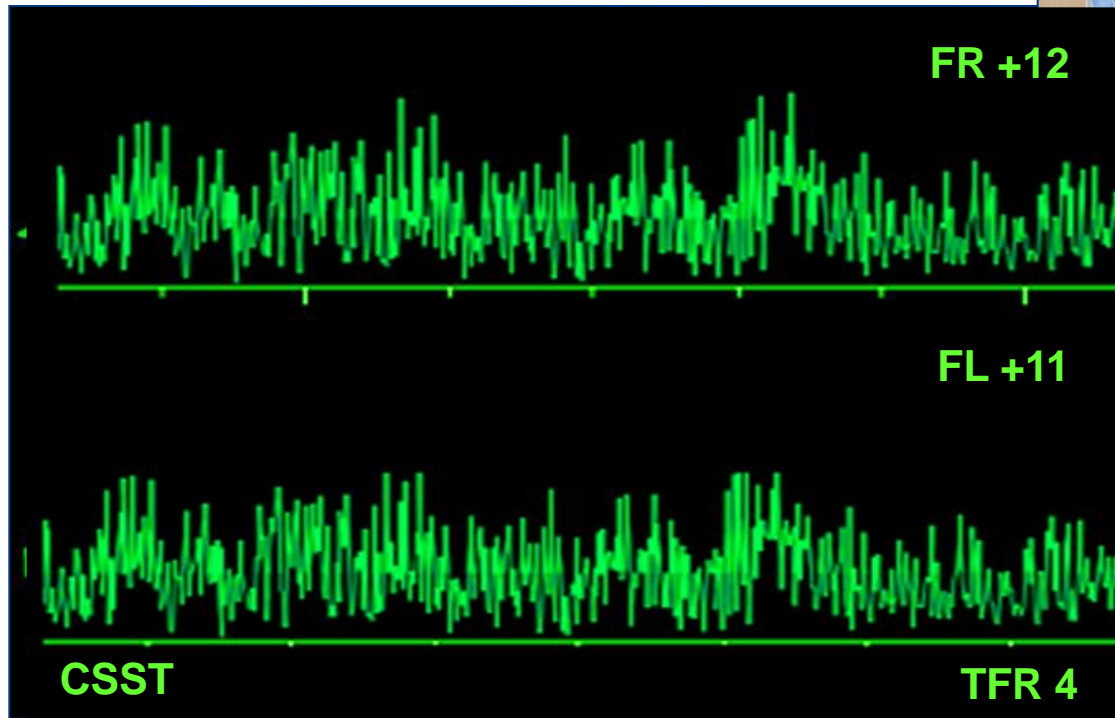
# Smart Use of Technology and Jumps



**Technology allows to improve Systems, Organization and Operations, but requires Training and Education**



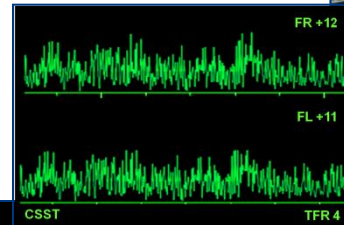
# Smart Use of Technology and Jumps



by technologies it becomes possible to guarantee continuous improvements and better performance, therefore....



# Smart Use of Technology and Jumps



FR +1



CSST

TFR 4

...this figure is about suspension vibrations of a Lamborghini Aventador... But speed could be better estimated by other gauges!





# Ecological Disaster Simulation



OIL PLATFORM



HELICOPTER



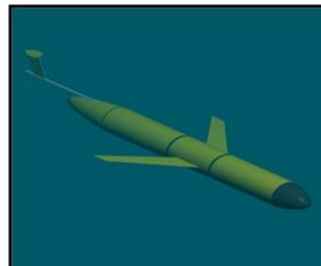
TUG



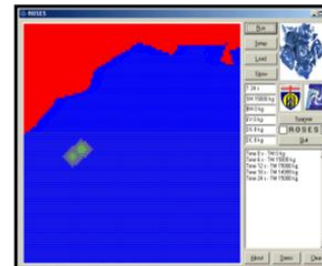
FIRE FIGHTING



AUV



OIL SPILL



SCUBA DIVER

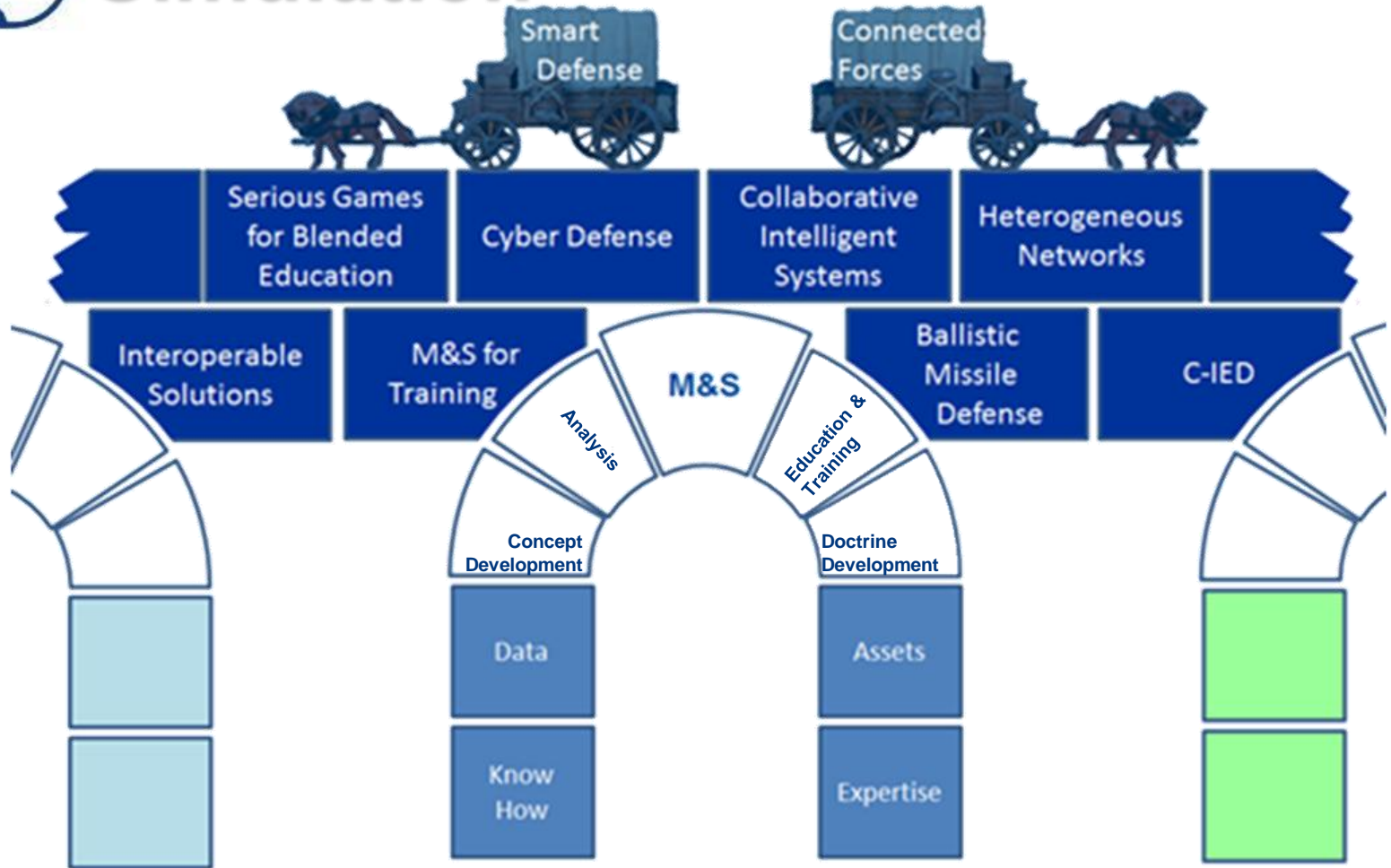


*This is an example where Simulators were available for each component and not a single Joint Exercise was conducted*





# Smart Defense and CFI and Simulation







# M&S Over Domains

## Trans Disciplinary & Multi Dimensional Mosaic

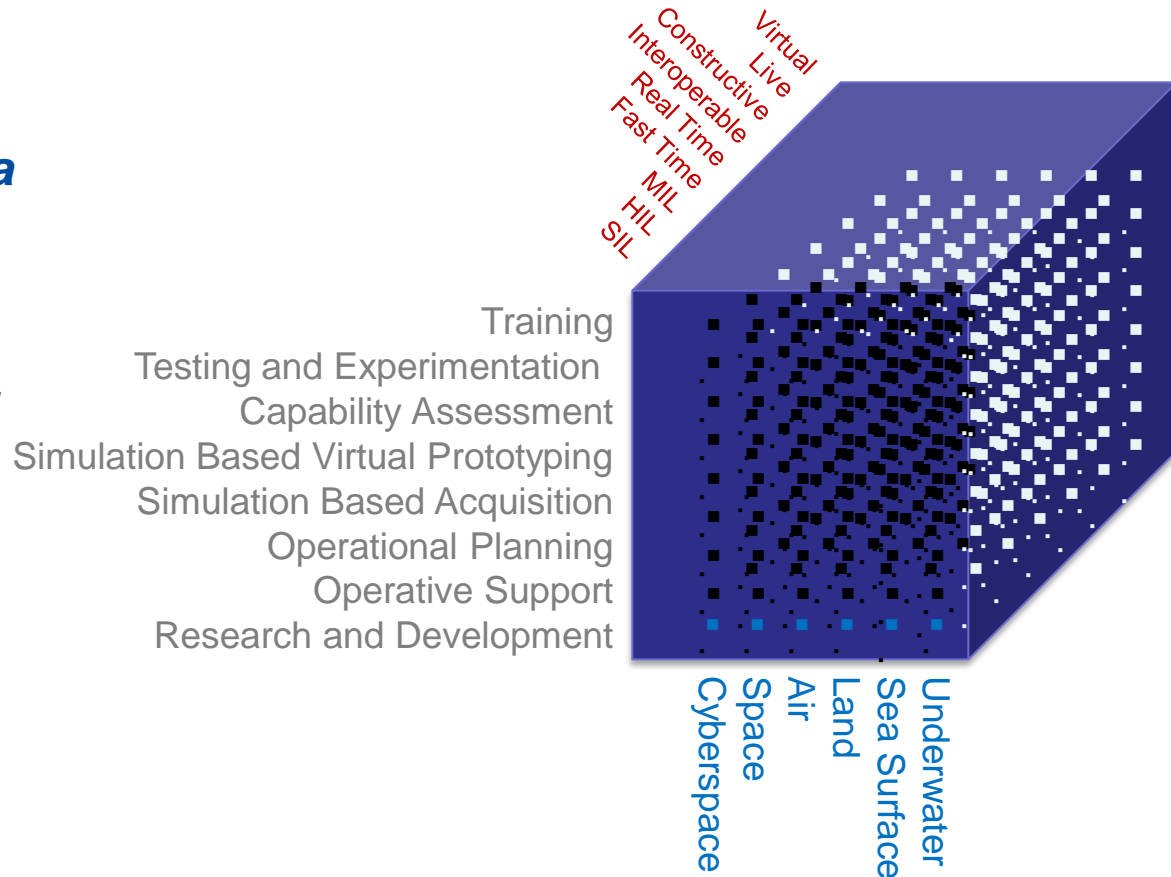
*There is a  
necessity for New  
Integrated  
Training  
combining  
Services and  
Domains and  
preparing to  
operate over  
different Time  
Horizonts*

	Sea Surface	Underwater	Land	Air	Space	Cyberspace
Political						
Military						
Social						
Economic						
Infrastructure						
Information						



# Multi Paradigm & Scenario Spaces for M&S at CMRE

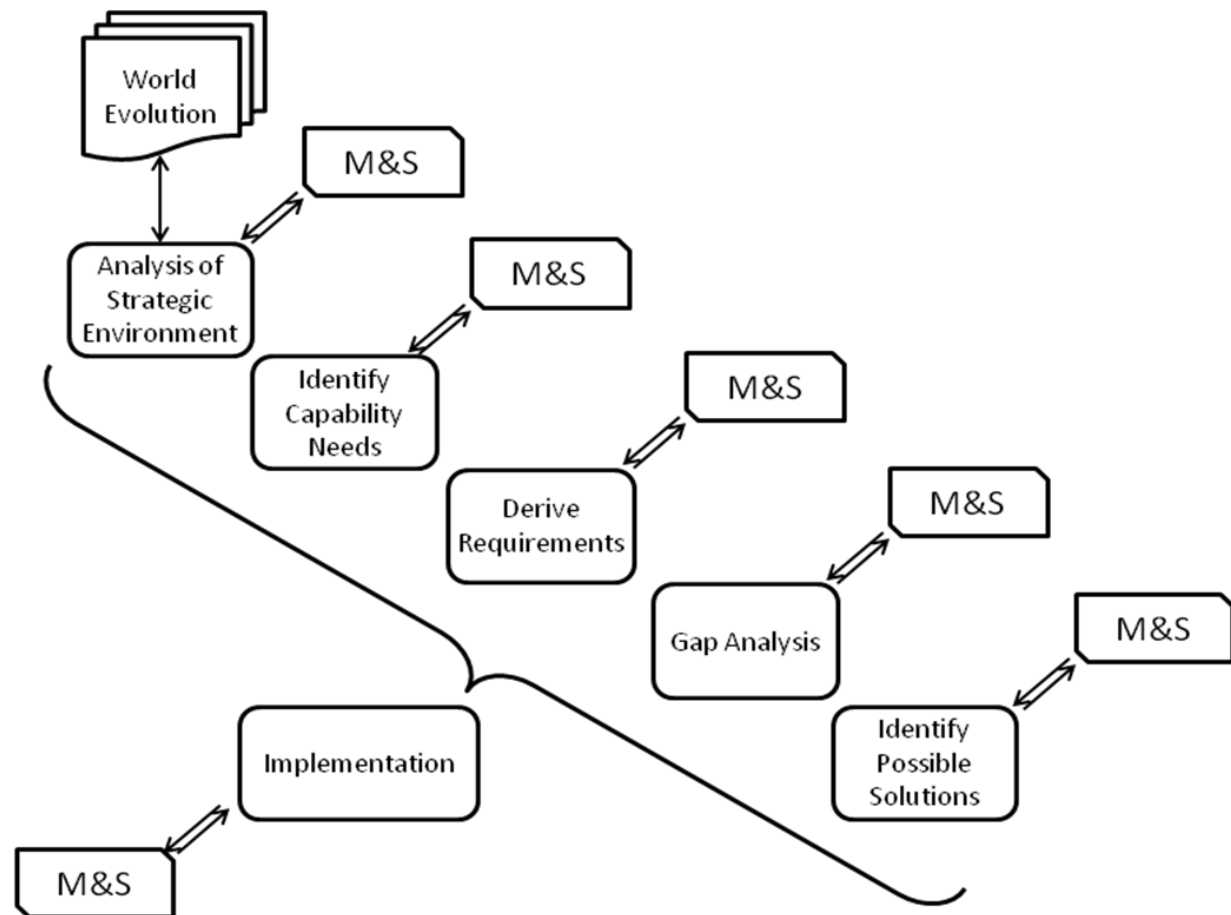
*M&S represent a crucial element due to his capability to address different part of the problem by combining different approaches*





# M&S as Critical Element for Implementing Transformation

*M&S is a Strategic Science that allows to study new Mission Environments and Context and to evaluate new policies and solutions*

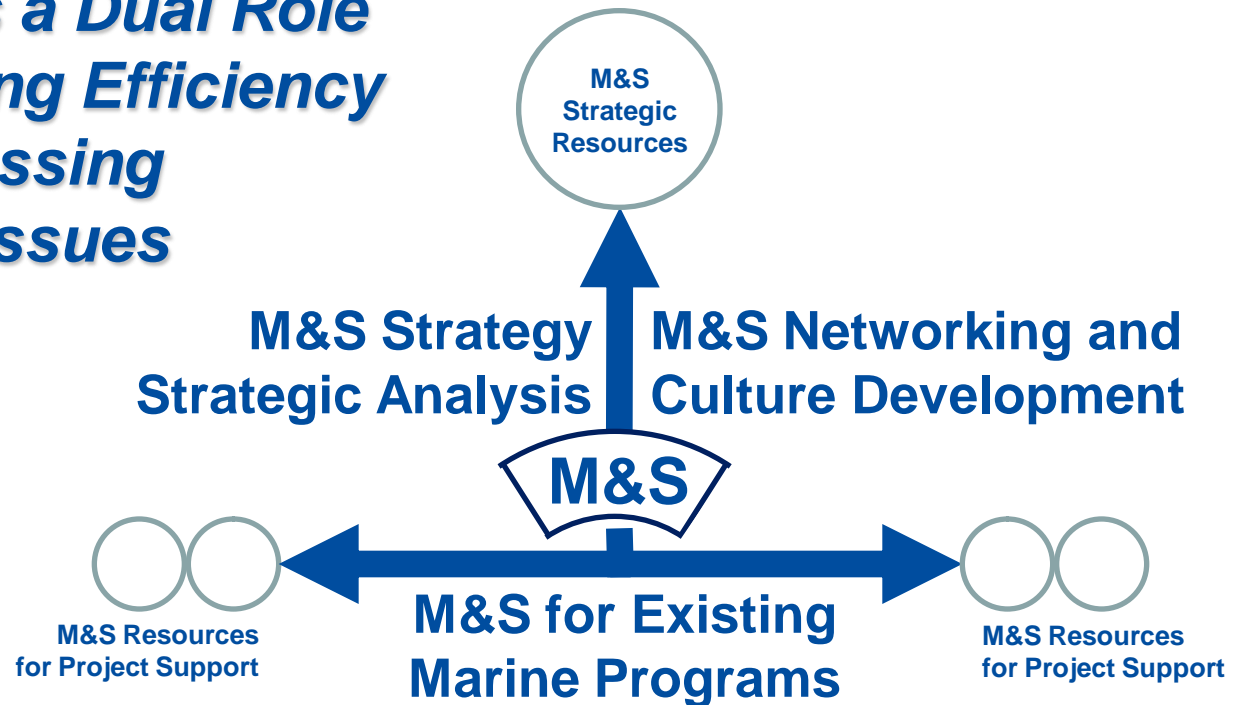






# M&S Dual Role of M&S

***M&S has a Dual Role  
in Improving Efficiency  
and Addressing  
Strategic issues***





# CFI & M&S Support Activities

- Development and Extension of Distributed Education, Training and Exercises to improve e-Learning and enhance the use of simulation and simulators
- Development to improve connections and joint training in NATO and National training Centers
- Improved Exercising through better use of modern technology
- Implementation of the Innovative Network Capabilities within Future Mission Network concept
- New Developments for improving the process by which interoperable capabilities are demonstrated and validated, in particular by making use of NATO exercises and trials

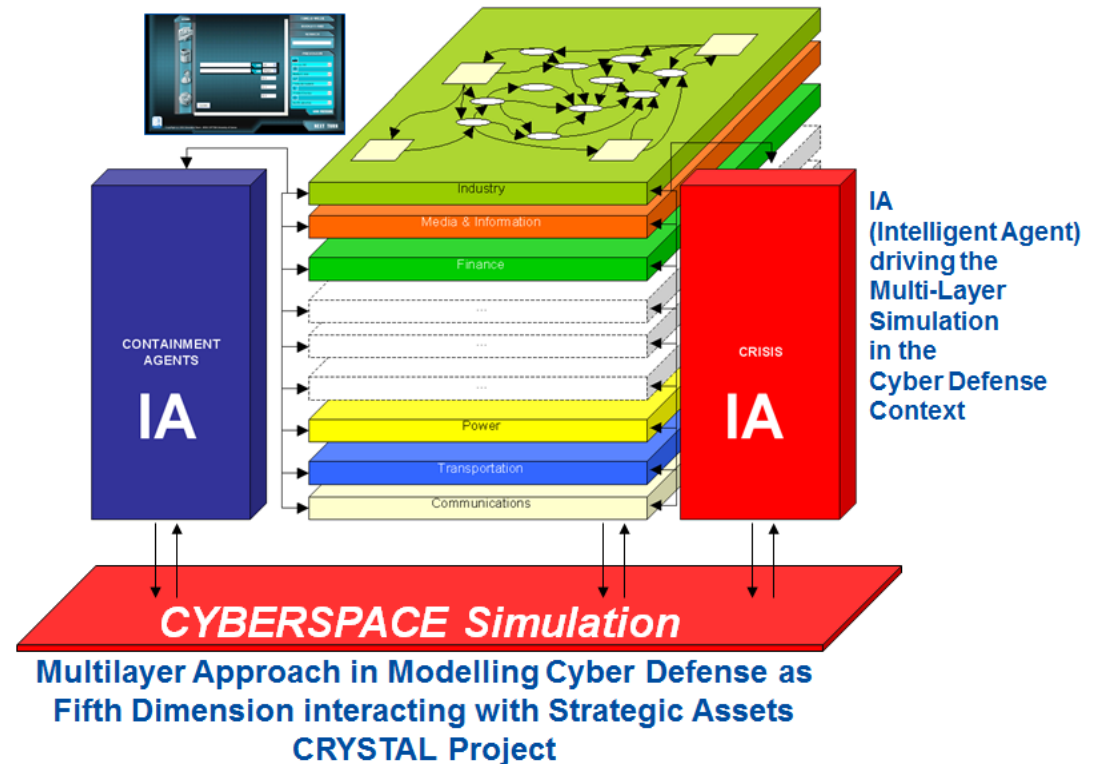




# Training through Simulation of Cyber Warfare

Example of CRYSTAL Project

Multi-Layer Models interacting in the whole Simulation



*Cyberspace represents a New area where to develop Training & Educational Programs*





# CRYSTAL

## Cyber Reality Simulation for Threat Assessment and Defense Learning

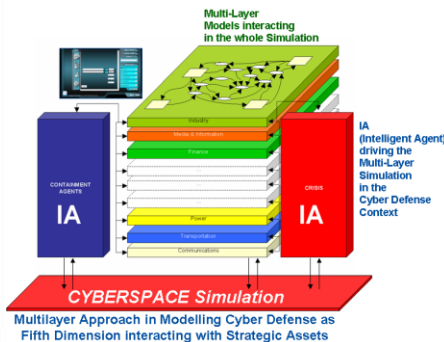


# Simulation Team

Microsoft



The CRYSTAL is a PNRM Proposal to the Italian MoD 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).





# 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



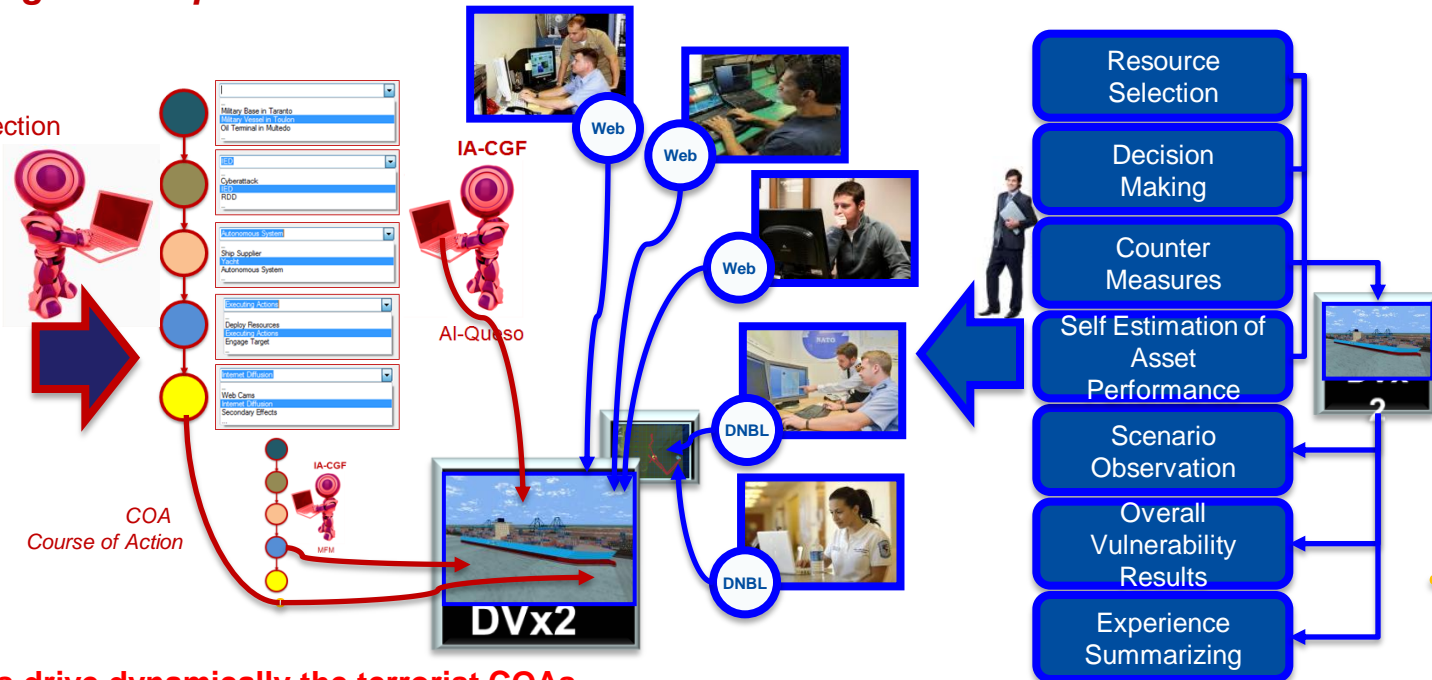
- The intelligence reports are distributed among the players based on their capabilities and shared by a stochastic engine
- The Identification of the attacks in time is the key for individual success; the players cooperate and compete for budget and success
- Threat missed to be identified generate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

# Example of Training, Education and Crowdsourcing for DAT



Terrorist Groups managed by **Intelligent Agent Computer Generated Forces** Human Player access remotely DVx2

- Identify Target, Info Collection
- Planning Attack
- Preparing Resources
- Executing Attack
- Media Exploitation



The Intelligent Agents drive dynamically the terrorist COAs in the DVx2 Game that simulates the related scenario evolution. The Human Players experience remotely DVx2 Serious Game by facing these threats with their Solutions; they provide to DVx2 their own Estimations and they obtain Overall Vulnerability Results

The Player evaluations allow to create a benchmark among different users and to test different approaches against Terrorist Attacks and Homeland Security Threats





# Re-Use and Extension of Training Aids

*Combining Different Models, Simulators and Serious Games allows to create new opportunities for Simulation as a Service*



Example of Federation with Helicopter Simulator

Deck



Virtual World



Logistics



Heli Crew



Ship Crew



Virtual Humans directed by IA



HLA Interoperability to connect other Simulations

**RAMSES**  
Serious Game Server



**Web Based Simulation**

Example of RAMSES 2012 © Simulation Team

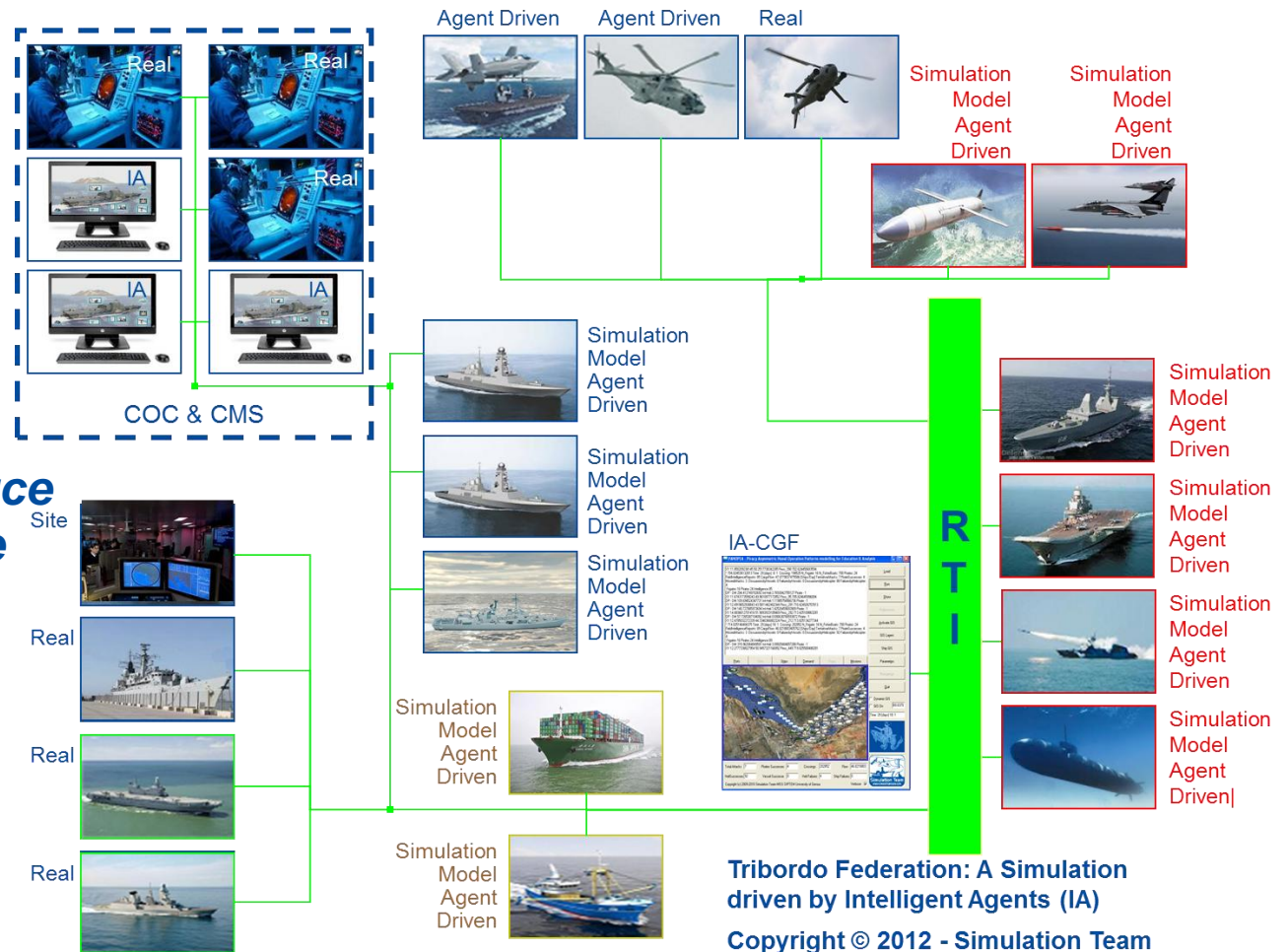




# New Opportunities for Lean Training

**TRIBORDO**  
Example uses  
Intelligent Agents

In order to reproduce  
also some Console  
Operators in order  
to run Exercise  
in easy way



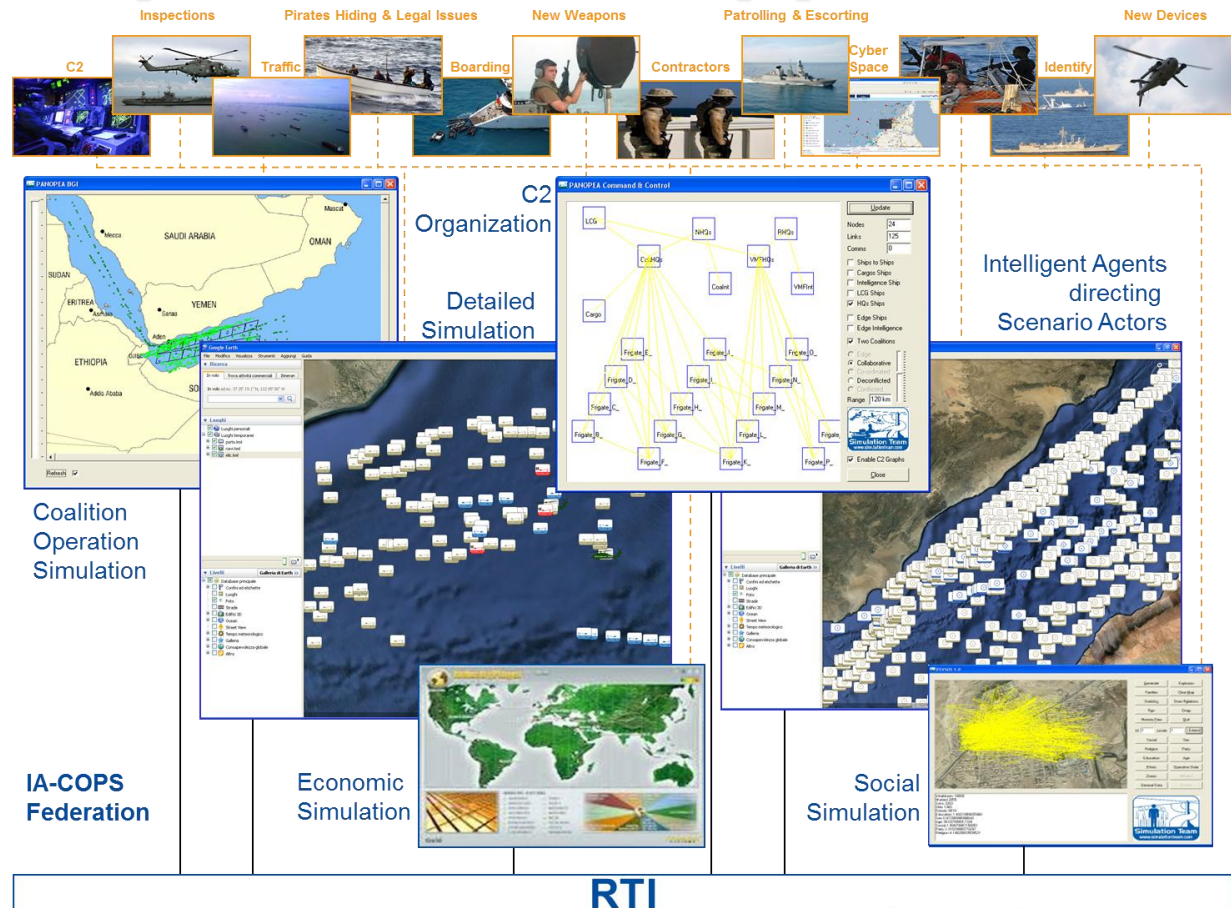
Tribordo Federation: A Simulation driven by Intelligent Agents (IA)

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# Example of how to Move to a Comprehensive Approach



Panopea Simulator could be integrated with different layers in order to address piracy problem in a comprehensive approach

RTI

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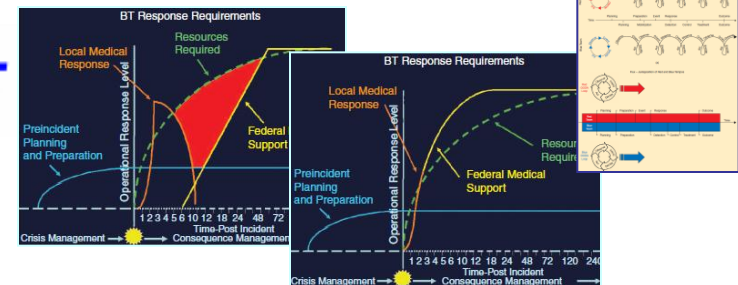
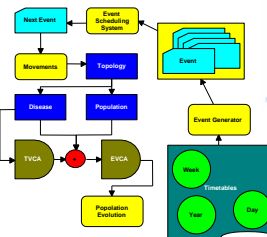
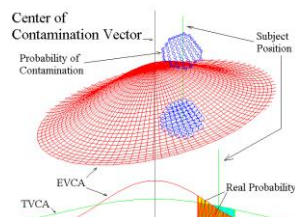


# PANDORA

*PANdemic Dynamic Objects Reactive Agents*



- 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 DIPTM, 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.

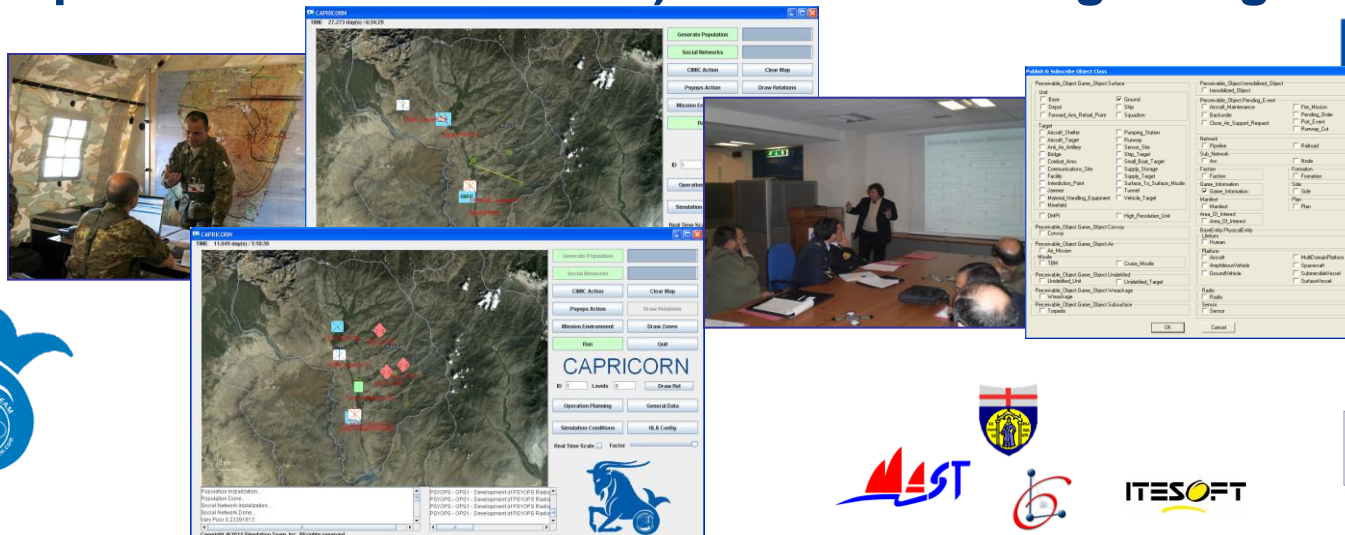




# CAPRICORN

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

- CAPRICORN is an active 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)





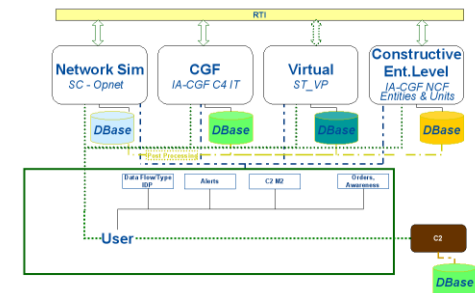
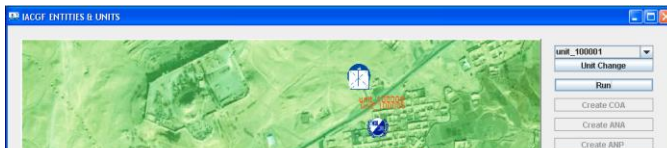
CeSiVa

# CGF C4 IT

Computer Generated Forces C4 for Italian Army



CGF C4 IT Project 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



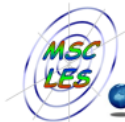
# SIMCJOH Project



The SIMCJOH (Simulation of Multi Coalition Joint Operations Involving Human Modelling) project is a joint R&D initiative coordinated by University of Genoa (Italy). SIMCJOH objectives are to study and develop new simulation models, in order to support the decision makers in Joint and Multi-Coalitions scenarios, considering a strong involvement of human factors with a particular focus on issues of refugees and civilians, natural disaster relief with presence of civilians in a theater of military operations; the initiative get benefits from innovative researches in population and human behavior modeling



DIME  
Università  
di Genova





## 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 DIPTM University of Genoa and MAST.





# Conclusions



- Education and Training will be more and more a Strategic Assets in all the sectors to operate over new scenarios within a Comprehensive Approach.
- Evolution in Social and Technological Frameworks should be addressed by simulation in advance
- M&S Should be used to develop Cultural Awareness and Technical Background in Alliance
- Comprehensive Approach should become a more concrete experience in term of how to address complex scenarios in new environments
- It is necessary to use M&S as enabler to avoid risks and gaps





# References



DIME

**DIME University of Genoa**  
*www.itim.unige.it*  
*www.simulationteam.com*  
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