Simulation Team
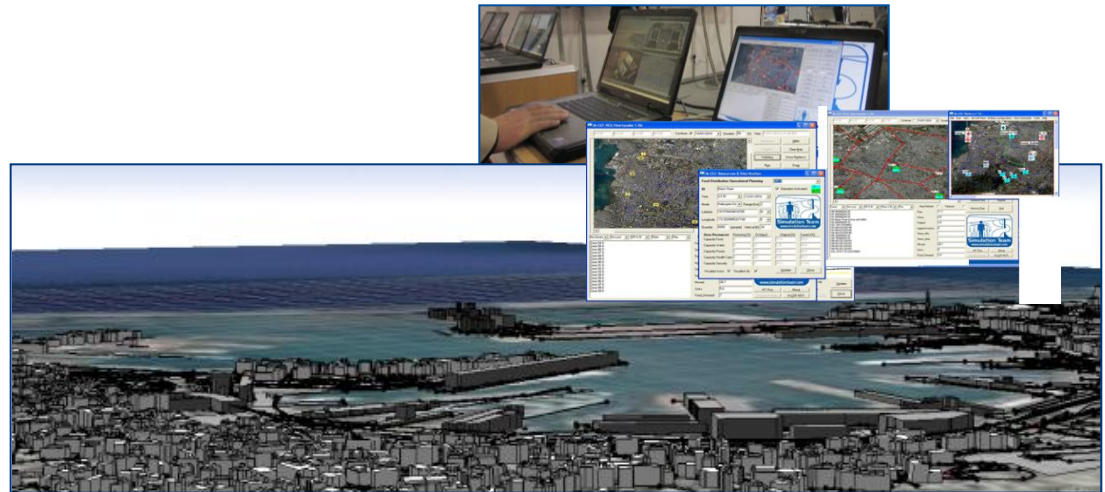
Decision Theater & Security Demonstrator

Verticale Sicurezza del Territorio

Agostino G. Bruzzone

Marina Massei

Matteo Agresta

Simulation Team
DIME Genoa University

URL   www.itim.unige.it
Email: {agostino.massei} @itim.unige.it
*   matteo.agresta @unige.it*

Simulation Team

Simulation Team Genoa

The Simulation Team in DIME of *Genoa University* carries out many industrial projects in cooperation with the large corporations and Small and Medium sized Enterprises; some example of recent industrial simulation project are following:

ENI Group   Fleet Management Planning & Scheduling Chemical Plant Logistics Optimization

Ansaldo   Plant Service Management and Optimization

LAMCE Petrobras   Oil Platform Simulation and Augmented Reality

EDA   Decision Support for Country Reconstruction Activity Planning

Ford Motor   New Production Line Design Based on Simulation

Members of MISS are appointed in several positions in simulation community such as:
- General Director M&S Net (34 M&S Centers Worldwide)
- President Simulation Team (20 Centers Worldwide
- Chairman of Technical Chapter in SCS and Past Associate VP
- Members of NATO MSG, IST, SAS,

DIME
Università di Genova

Simulation Team

Who Are We?

Universities, Research Centers and Companies operating worldwide in synergy for developing Innovative Solutions with a particular focus in Modelling and Simulation

DIME
Università
di Genova

MAST

CALTEK

www.liotech.co.uk

M&Snet
Genoa

Liophant
Simulation

CENTRALABS

CentraLabs
Cagliari

CRiCS
Centre for Research
In Complex Systems

CSU
Australia

CIREM
Università di Cagliari

DLM
aeronautics

Antoptima
we speed up your business

MSC
LES

MSC-LES

Mik
Riga TU

Universidad
de la Rioja

SIM·FUTURE

etea SICUREZZA

Blizzard Srl
Software evolution

VIRTUALY

LOGIXTICA

DIPMEC
Università Calabria

SimCenter Universitat
Autonoma de Barcelona

Perugia
Perugia Center

Università di Perugia

LSIS
Marseille

GRVa
LAMCE
COPPE.UFRJ.BR

Rio de Janeiro
Brazil

MITIM
Simulation Team
Genoa Center

McLeod Institute of Technology &
Interopeable Modeling Simulation
Genoa

SPIIRAS Russian
Academy of Science

gli

IMS-LAPS
Univ.Bordeaux
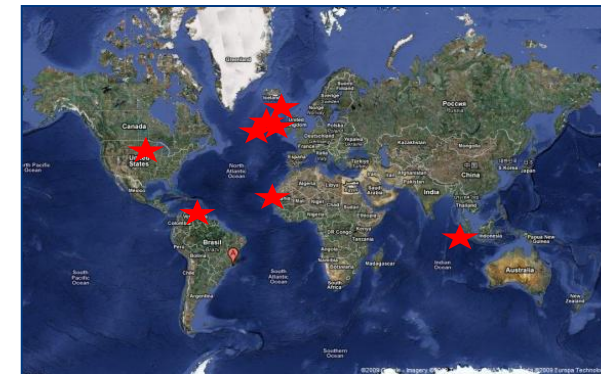
DIME - University of Genoa

DIPTEM was founded in 1997 as evolution of the Institute of Technology and Industrial Management (ITIM) that was operative from '60.
In 2011 DIPTEM evolved in DIME and it is currently composed by about 80 faculty members, 15 technicians and administrative, plus several PhD Students, external Researchers and Consultants.
DIME teachers are involved in Undergraduate, Postgraduate and Professional activities in Engineering, Management.
DIME active in R&D Projects for major Institutions, Companies and Governmental Organisations.
DIME co-operates actively with major Excellence Centers World-Wide.

DIME
Università di Genova

Simulation Team

McLeod Institute of Technology and M&S M&S Net Genoa Center

Simulation Team Genoa Center

Email: agostino@itim.unige.it   URL: www.mcleodinstitute.org
www.m-s-net.org
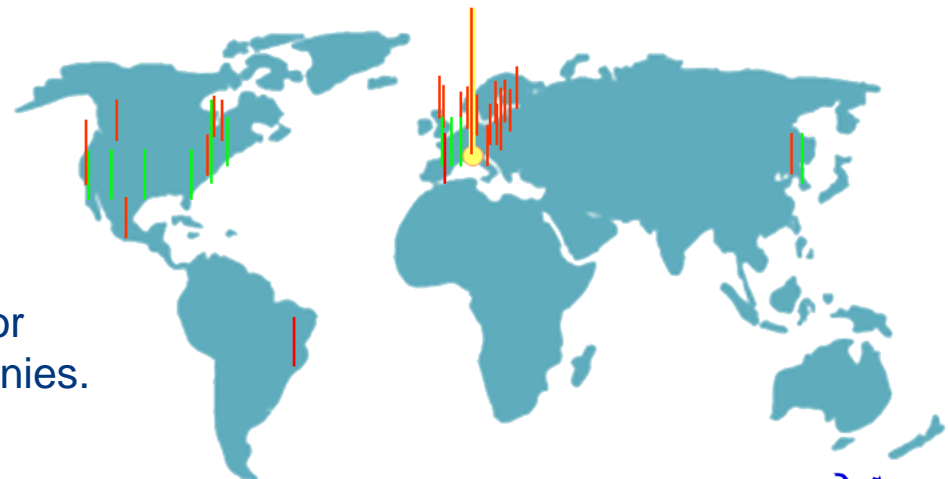
M&SNet

The research group of DIME of *Genoa University* is active from '60 in Simulation applied to Industrial Engineering and is cooperating with M&S Net and MITIM

The activities involve modeling, simulation, VV&A and analysis of Industrial Applications and Services (design, re-engineering, management, training etc.) as:

Chemical Facilities	Power Plants	PM
Harbor Terminals	Public Services	Environment
Manufacturing	Assembling	Logistics
Public Transportation		

The Department staff is in touch world-wide with the simulation community and is present actively to conferences, exhibitions and working meetings with the major Associations, Agencies and Companies.

34 M&S Net Centers World-Wide

DIME
Università di Genova

SMARTCITY Decision Theater

Original Configuration

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 Are involved in the experimentation as well as Lombardia and Piedmont Regions. Simulation Team develops the Population and Social Network Models and Simulators. The original DT project evolved in 2014 upgrading partnership and the architectural solution.

Simulation Team
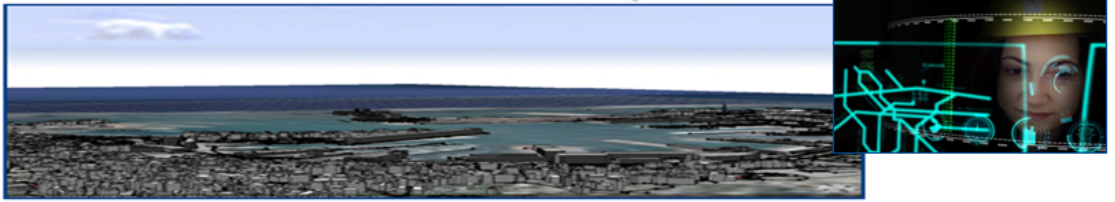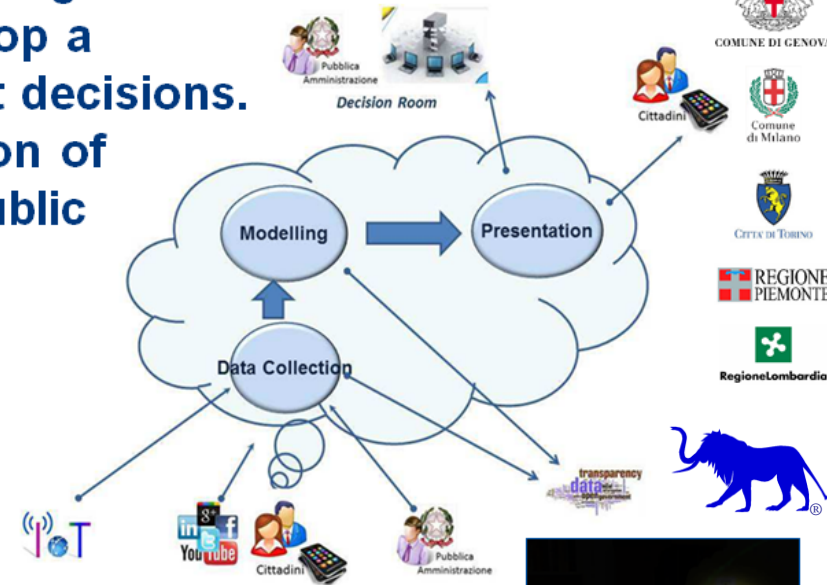
Decision Theater and Human Behavior Modeling

HBM represents a powerful technique able to model population considering multiple levels such as Political, Social, Economic, Information and Infrastructures.

For instance to evaluate the impact on the population deriving from an invasive public construction work decided by local authorities in order to improve population mobility or to prevent natural disasters

Furthermore HBM are useful to support the authorities to take the best decision; for instance in terms of evacuation or alerting solutions in case of a potential natural disaster (e.g. considering "crying wolf")

HBMs allow decision makers to estimate risks and to understand alternative people reactions in order to adopt proper prevention measures, emergency management policies and, even, possibility of false alarms
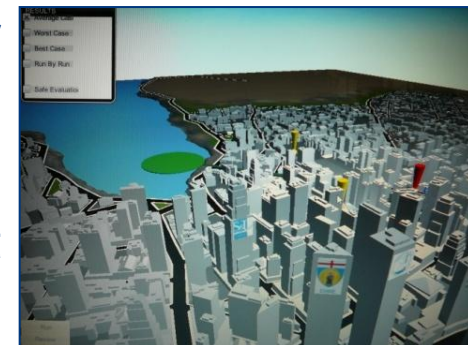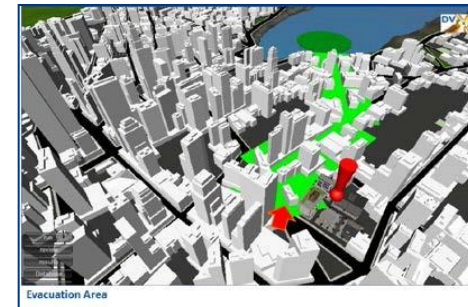
Decision Theater Foundations

DT Main Capabilities:

- **Quantitative assessment of the impacts of long-term policies**
- **Analysis of alternative scenarios considering implementation approaches and incentives**
- **Spreading policies to citizens and collecting feedback from them**

DT Users:
- **Decision Makers in Public & Governmental Institutions**
- **Citizens & Interest Groups**
- **Scientists and Consultants**


DIME
Università di Genova
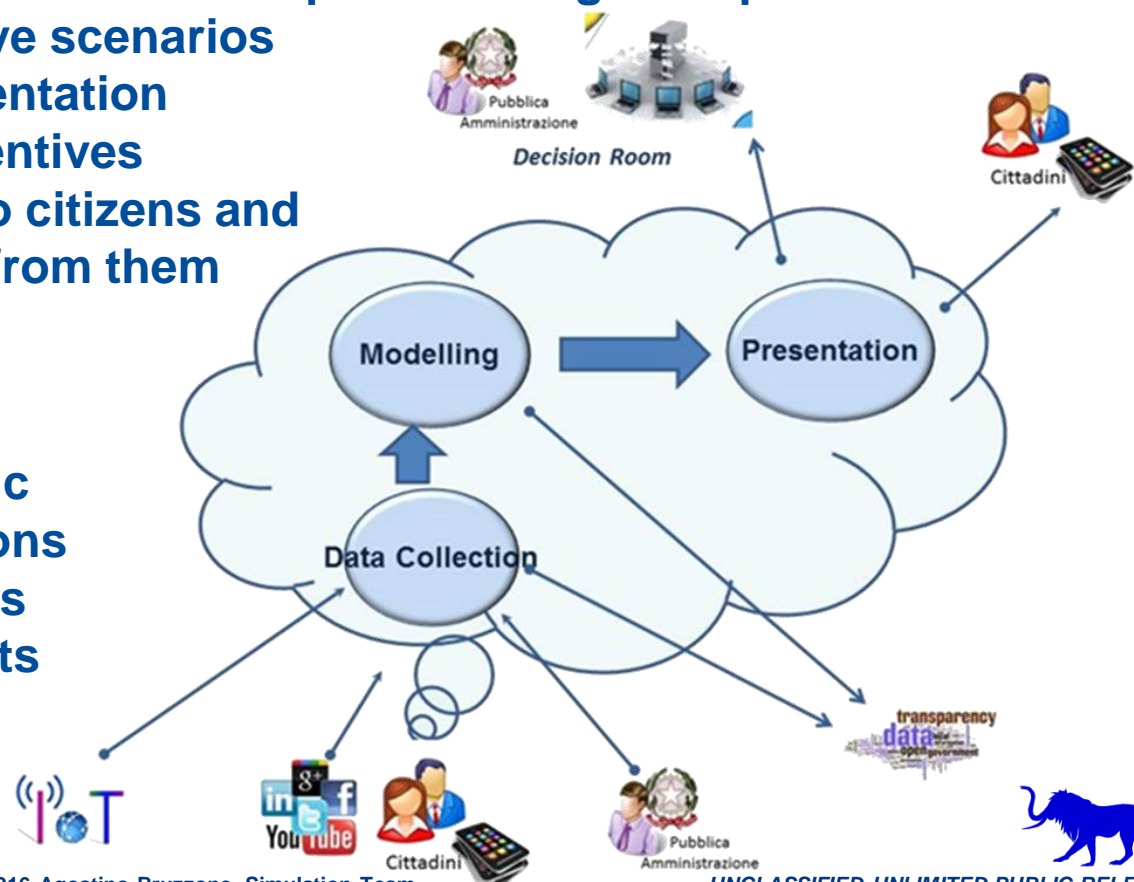
Introduction to Modeling in Decision Theater Project

The Modeling within Decision Theater project is devoted to carry out R&D activities with the aim of understanding at which extent interoperable simulators could be used for analysis of alternative Courses of Actions and Situation Evolutions to address and solve specific problems where **Human Factors, Specific Open Data, GIS** are very relevant.

Modeling & Simulation (M&S) makes possible recreating complex scenarios and carrying out what-if analyses with the aim of evaluating the effectiveness of several alternatives.

Simulation Team DIME University of Genoa focuses on **Security Demonstrator** (*Verticale Sicurezza*)

DIME
Università di Genova

Simulation Team
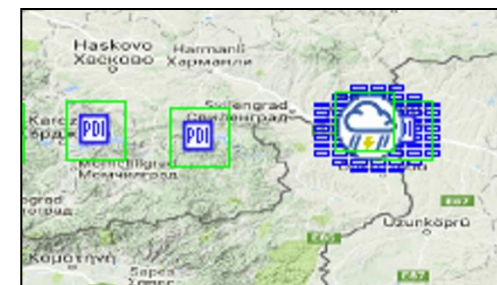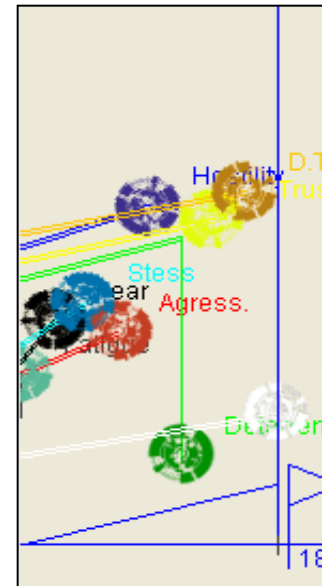
DT: A Project driven by Demonstrators

DT is based on a common Platform and three different Demonstrators (Verficali) dealing with three major issues affecting Smart Cities, so the following Demonstrators have to be developed:

- **Energy**

- **Welfare & Inclusion**

- **Security**

MOSES
Modelling Sustainable Environments through Simulation
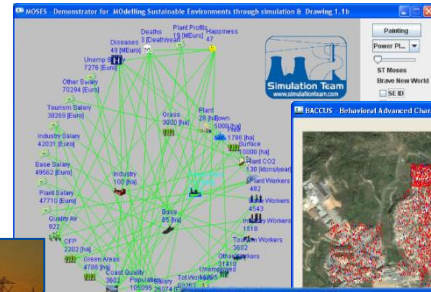
BACCUS
Behavioral Advanced Characters & Complex Systems Unified Simulator

The DT Models aim not just to predict future evolution of crises, but to create consensus and support preventive action

Katrina Like IA-CGF NCF

Simulation Team

Security Demonstrator: Flooding Focus

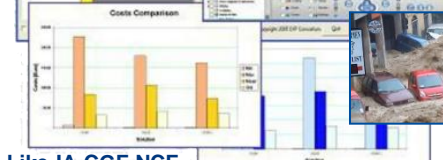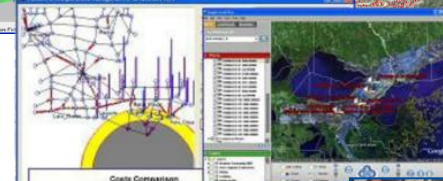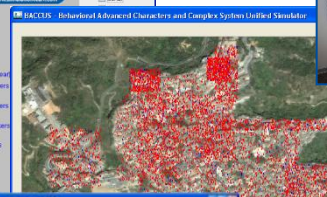**Simulation Team, DIME, University of Genoa leads the Security Demonstrator (Verticale Sicurezza) that is focused on Flooding and applied on the Genoa District considering the nature of this area. The focus is in evaluating preventive actions as well as different measures to be applied to prevent and mitigate this kind of disasters. The simulator should be able to copy the Human Factors as well the disaster dynamics and countermeasure dynamic actions**

It is proposed to adopt a Stochastic Interoperable Simulator adoping MS2G (Modeling, interoperable Simulation and Serious Game) paradigm operating through an HLA Federation open to be connected with other systems and models

DIME
Università di Genova

Simulation Team

Decision Theater & Flooding

DT Simulation

GIS DATA

BOUNDARY CONDITIONS
- Weather Forecasting
- Wind Speed
- Rain intensity (probability)
- Humidity

OPEN DATA

PYSICAL LAYER
- Orographic Profile
- Rivers

URBANIZED LAYER
- Pipeline
- Point of Interest

HUMAN LAYER
- People
- Units
- Group

Attitude Array of Connections

Groups

Relationship Array

Internal Relationships Array

People

Units
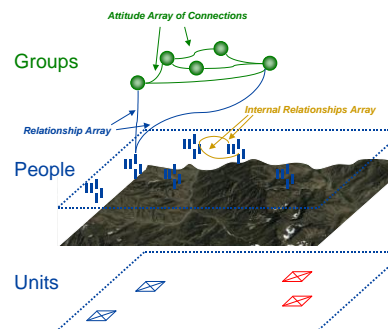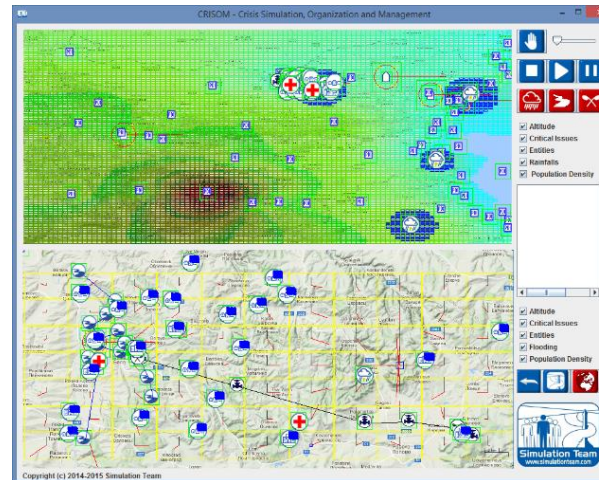
Estimation of Crisis Impacts
• Damages
• Casualties
• Costs

Evaluations:
• Preventive Actions
• Mitigation actions
• Consensus

Info Supports
• Evacuation plan
• Involved entities :
  • People (schools, people with impediments, etc.)
  • Plants and Infrastructure (e.g. "Seveso", CI)

Human Factors:
• Stress
• Fear
• Fatigue

…

Simulation Team

Human Behavior & Simulation

The physical objects, processes and data flows are usually mapped in current simulation. Therefore Humans are often crucial part of these aspects, often with very strong impact on the dynamics, so it is more and more important to include *Human Behavior Models (HBM*

Copyright © 2010-2016 Agostino Bruzzone, Simulation Team
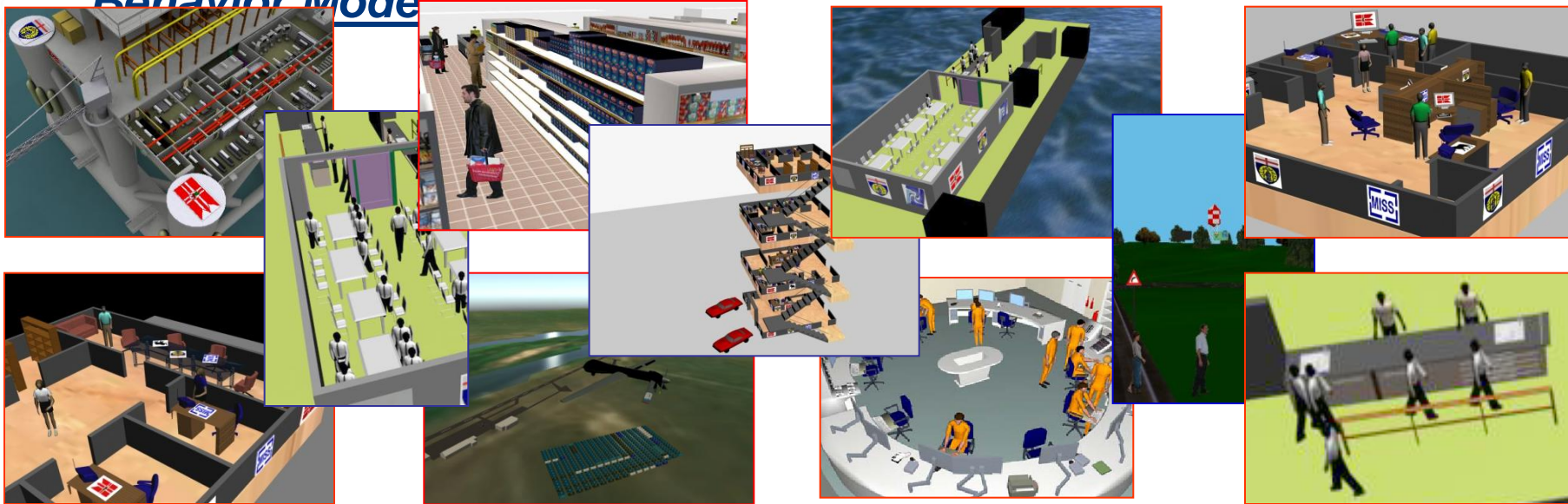
Simulation Team

Different Experiences
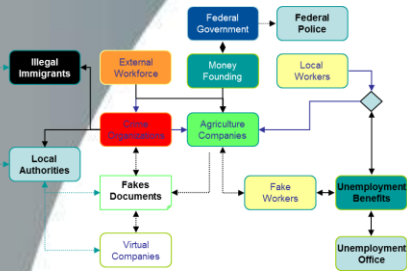
Indastria

Haiti IA-CGF NCF

SPIDER

SIMCJOH

RIOT
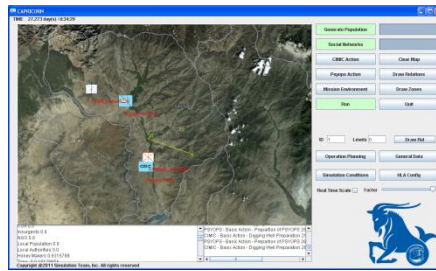
CAPRICORN
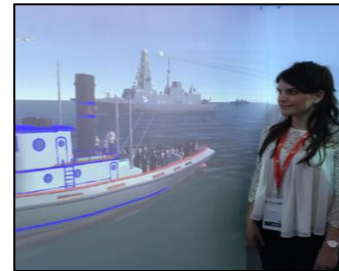
JESSI Immigrants

DIES-IRAE

PIOVRA

Katrina Like Tramas
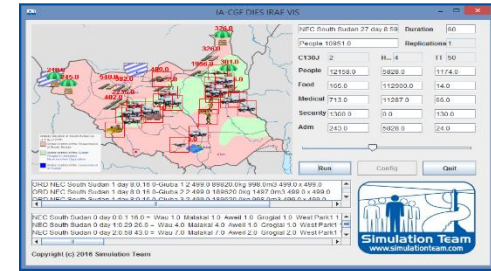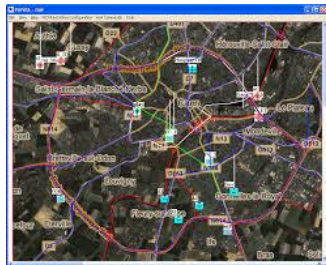
T-REX

CRISOM

DIME
Università di Genova
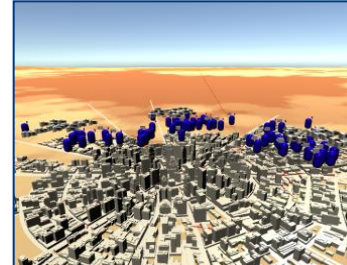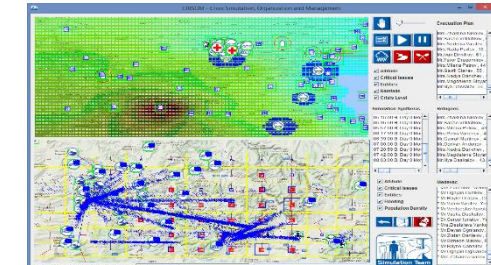
KATRINA LIKE

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.
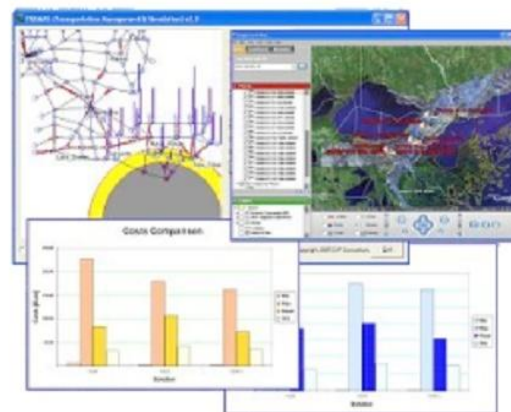
DIME
Università di Genova
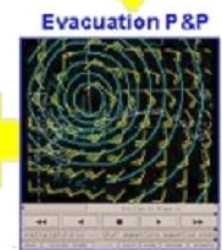
Simulation Team

Population M&S Capabilities

- *To support Training, Exercises and Experimentation by Population Models and Social Network Simulation*
- *To reproduce Social Networks in order to provide such feedback to the Decision Makers during exercises, and to develop references for Operations*
- *To reproduce the dynamics of population and social network reacting to the scenario evolution and different COAs*
- *To simulate the complex scenarios affected by Human Factors and involving Populations and Social Networks*
- *To apply Human Behavior Models (HBMs) embedded in Simulation Team IA-CGF (Intelligent Agent Computer Generated Forces) Non Conventional Frameworks*
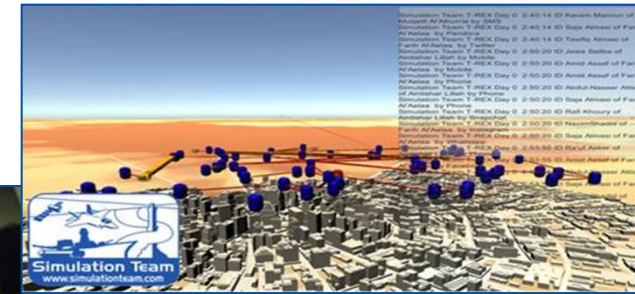
One Simulator… Multiple Resolutions

CRISOM - Crisis Simulation, Organization and Management
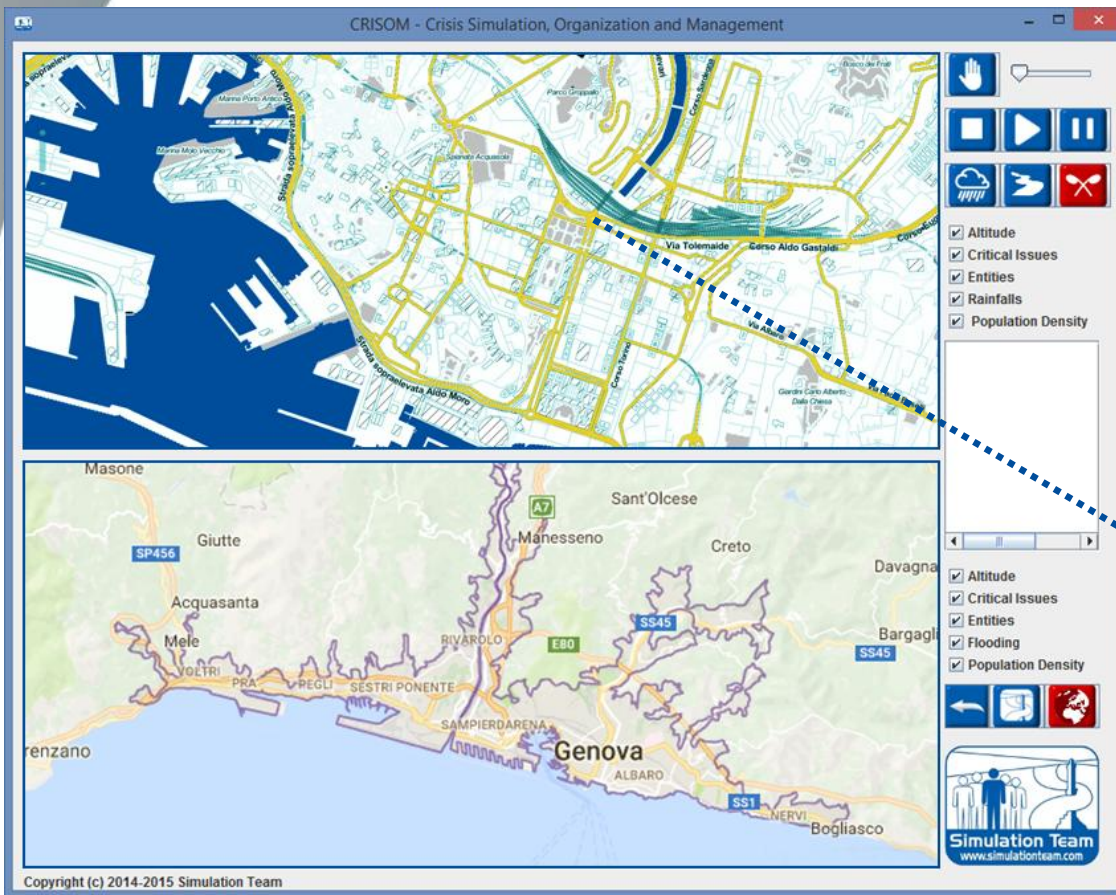
Decision Theater intuitive interface with multiple resolution . It is Suitable for the different command levels (Strategical, Tactical & Operative)
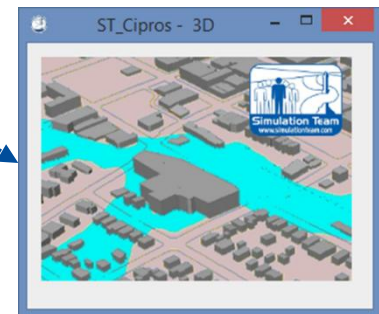
Modeling Urbanized Areas

Urbanized areas are result of natural and urbanized subsystem

- Natural system reproduces the natural landscape of the city : the sky, the ground, the sea, the rivers

- Urbanized System reproduces all the aspect connected with human activities: location of households, Industries, point of interest and mobility

System	Elements	Effect for the simulation
Natural System	Sky	Rain reproduction in the different zone of the city
	Ground	Simulating different ground permeability characteristics
	Sea	Simulating sea level fluctuation, and tsunamis
	Rivers	Simulating the overflowing due to high level of the water: Two different watercourses should be considered: −Fluvial −Torrential
Urbanized system	Location of households	Simulating the more populated zones during the night
	Location of industries	Simulating the more populated zones during the day
	Mobility	Simulating the effect of natural events near the Hydrographic Basin of the river to roads, rail, and highways
	Location of points of interest	Schools, hospitals, stadiums are points of interest where there is a greater probability of high population density during certain hours of the day

The interoperable approach allow to add the simulation specific additional model based on the phenomena to be produced

Modeling Urbanized Areas

The interoperable layer approach allow to increase flexibility for input data
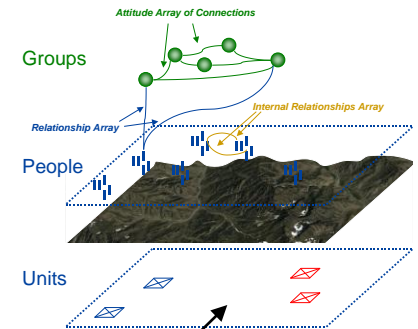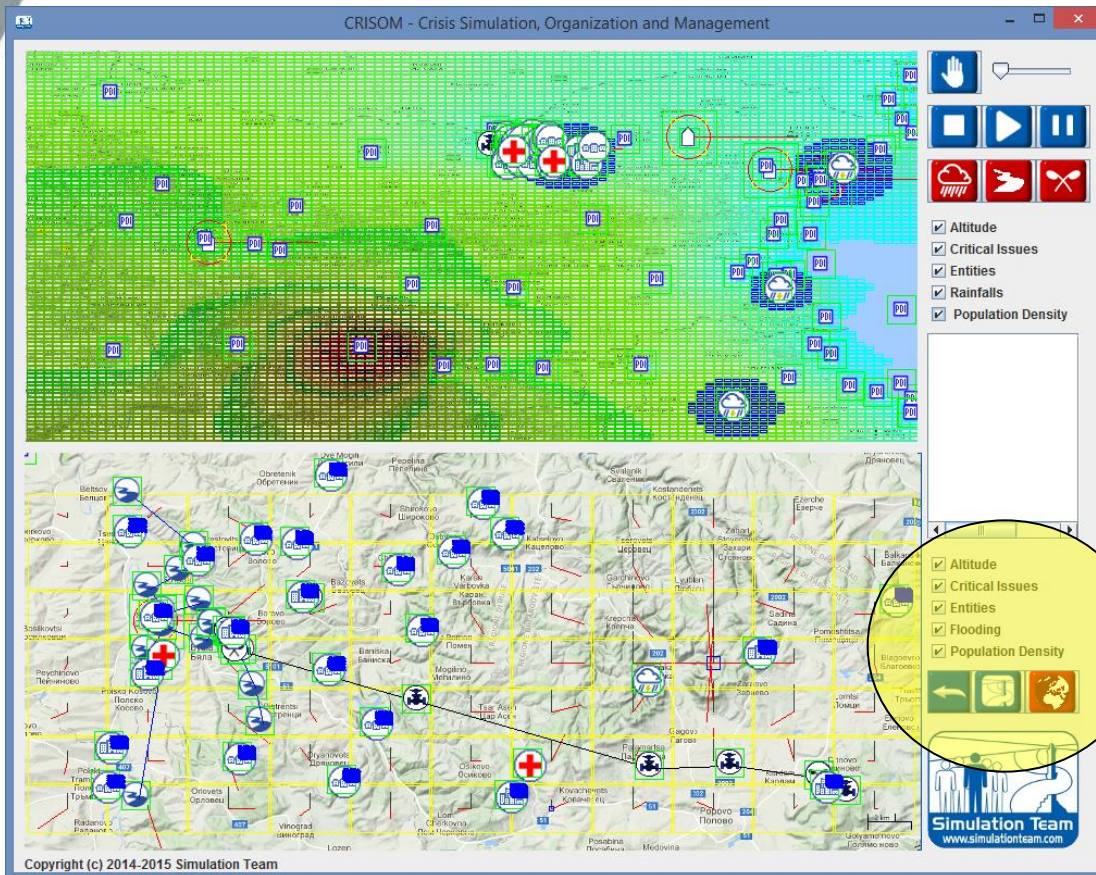
Multi Layer Population Modeling

Multiple Layers allows to simulate different domains and their interactions

Attitude Array of Connections

Multilevel Group Relations

Interest Groups

Internal Relationships Array

Relationship Array

People

Objects

Terrain

Entities

Copyright © 2010-2016 Agostino Bruzzone, Simulation Team

UNCLASSIFIED UNLIMITED PUBLIC RELEASE
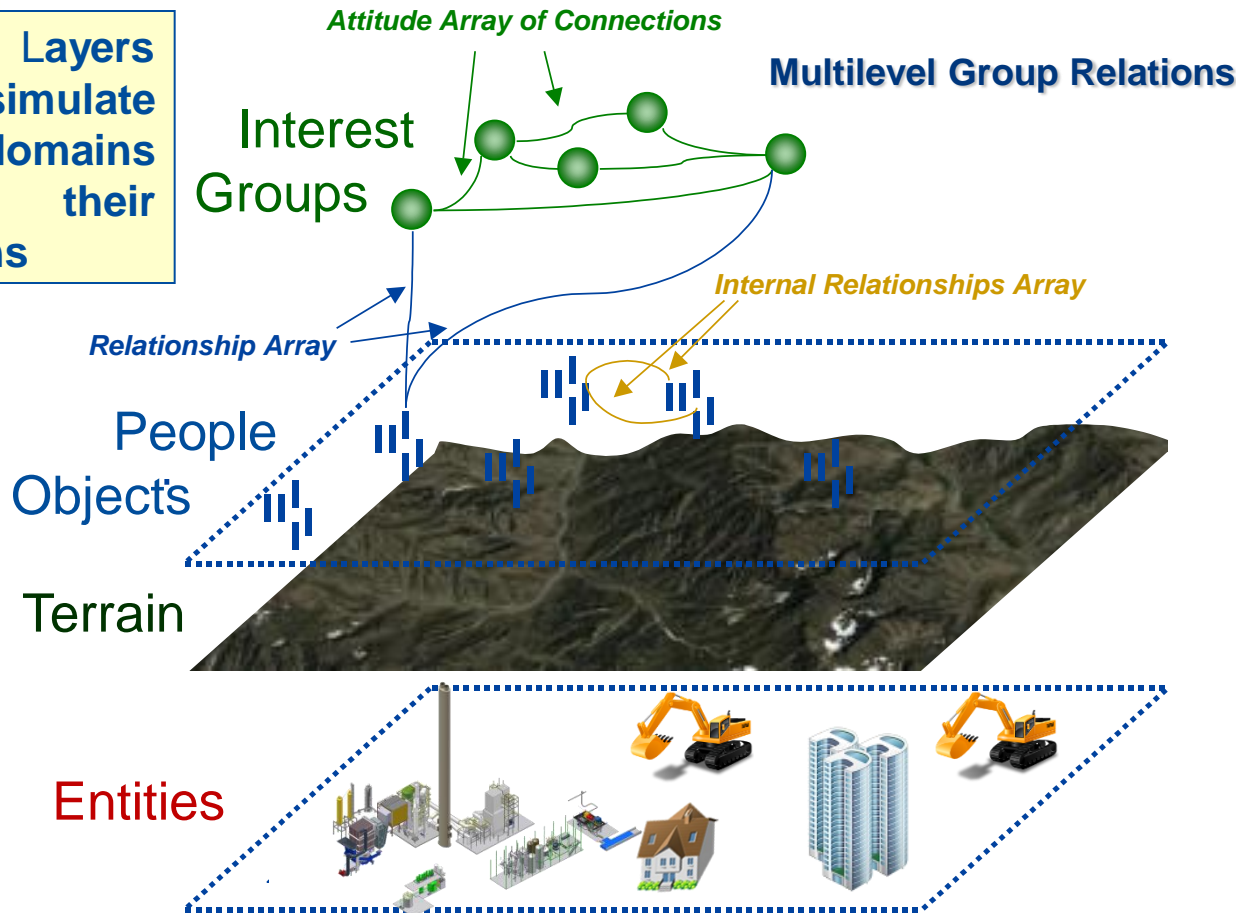
Simulation Team

Multidisciplinary &
Multi Layers

Activities related to the Complex Scenarios can't be planned or activated stand alone they are strongly related with social, economic and political framework locally and internationally Simulation need to take care of all these aspects and their interactions

CONTAINMENT AGENTS

IA

Industry

Media & Information

Finance

...

...

...

Power

Transportation

Communications

CRISIS

IA
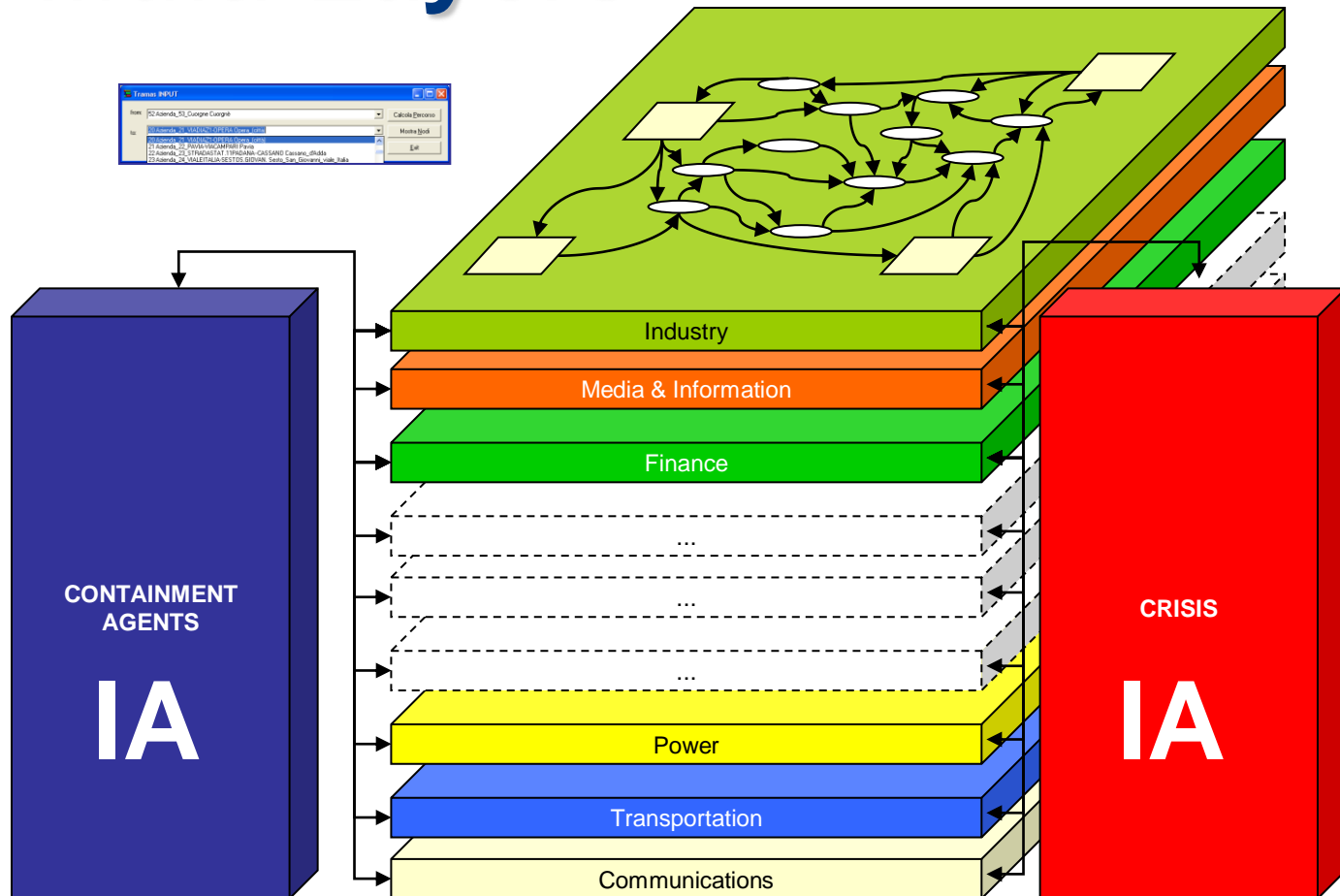
EXPONENTIAL COMPLEXITY FOR MODELING AND SIMULATION

Simulation Team

Boundaries and Constraints
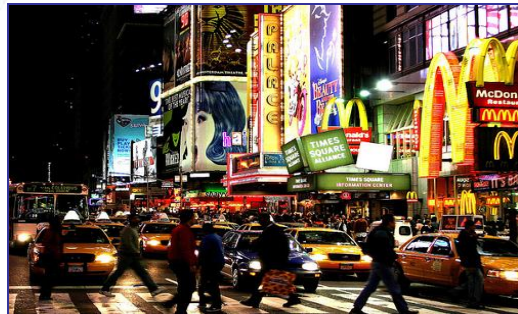
This new Generation Simulations have to face big challenges

Challenges in Country Modelling & Interoperable Simulation Opportunities

Multi Resolution High Efficiency Simulation

System Size

Large Systems	Country
Simple Systems	Complex Systems

System Complexity

Simulation

Modeling Multiple Interoperable Layers
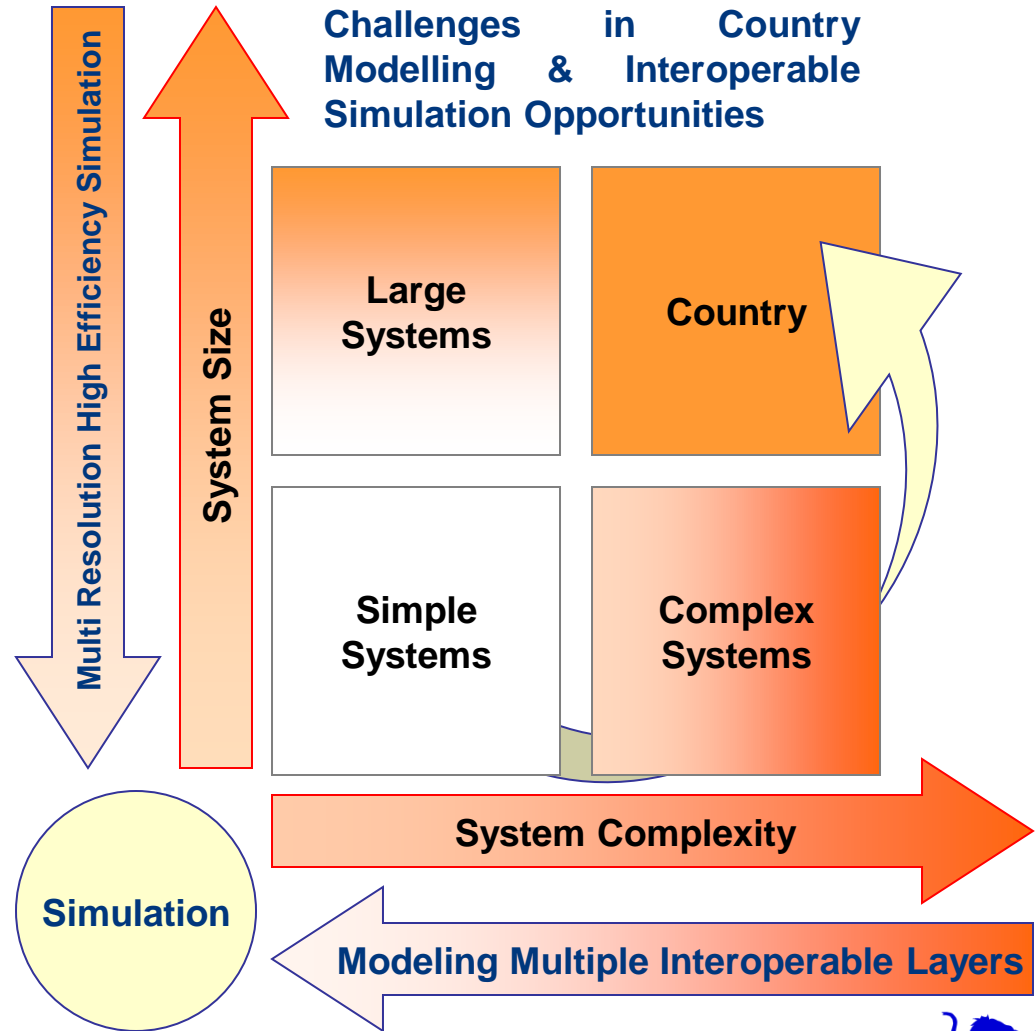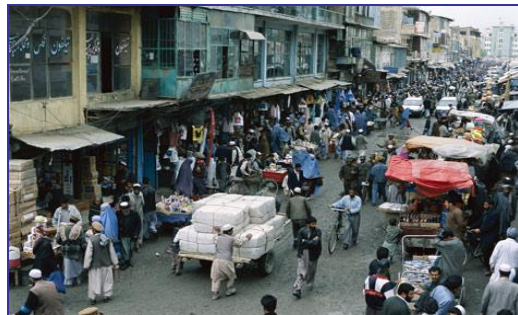
Simulation Team

Intelligent Agents, Simulation and Population

- Intelligent Agents (IA) and Modeling & Simulation (M&S) represent important to model Population and Interest Group Behaviors

- Human Behavior allows to consider the effect of emotional, organizational and rational aspects on Individuals and Groups respect events, decisions & crisis evolution

- Simulation Team, DIME, Genoa University have a very long experience in developing these models for reproducing scenarios in Europe, Middle East, Asia and America in relation to Country Reconstruction, Disaster Relief, Population Flows, Urban Disorders.

Simulation Team
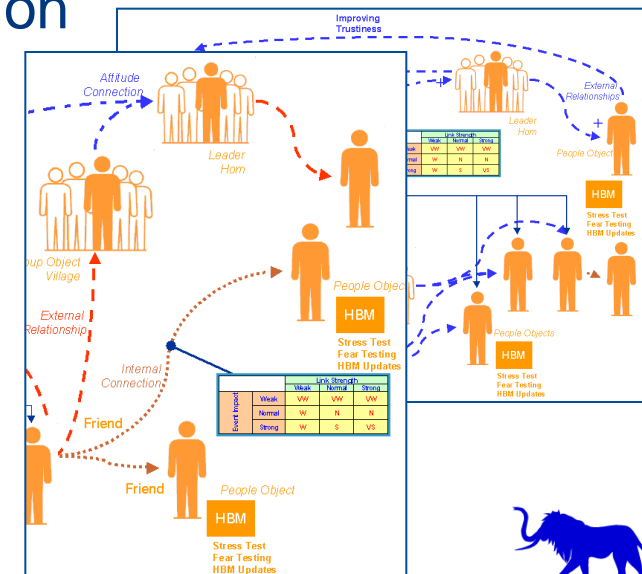
Modeling Human Behavior

There are several challenges in reproducing human behavior, since it is necessary to consider:

- Rational Decision Making
- Intelligent Individual Behavior
- Organization & Hierarchies

- Emotion and Attributes
- Psychology, Culture, Social
- Crowd Behavior
- Social Networks

Inhabitants of the city are simulated with single entities
- It is important to consider computer based entities with the following characteristics:

Autonomy:
Capability to operate without the direct action of humans, with some control of their internal state

Social Ability: capability to react with other agents (and possibly humans) with a communication language

Reactivity: ability to perceive their environment and respond to the changes

Proactiveness: capability to take the initiative
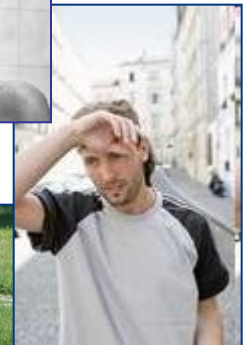
Conclusions

- **DT Security Demonstrator successfully faces new challenges on Interoperability , Disaster Generation & Human Behavior Modeling**

- **Decision Theater allowed to study and develop new simulation models in order to support decision makers**

- **The architecture, the Use Modes and the Conceptual Models have been successfully developed**

- **Decision Theater Federates as well as the Federation are Operative**

- **The Decision Theater Demonstrator is an interactive Live Experience available for Decision Makers**

DIME
Università di Genova
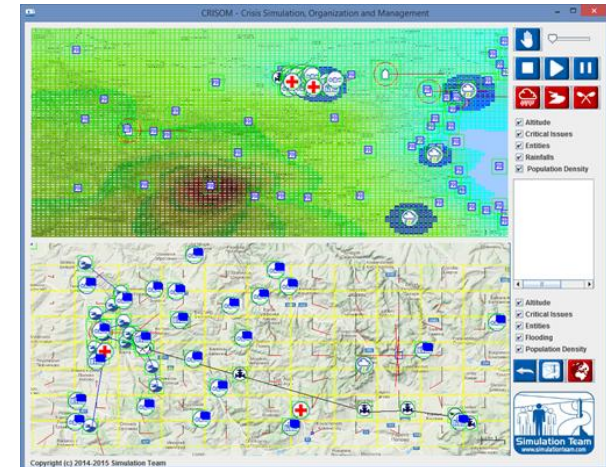
References (1/9)

- Aas, A., Johnsen, S., & Skramstad, T. (2009). CRIOP: A Human Factors Verification and Validation methodology that works in an industrial setting. Computer Safety, Reliability, and Security, 243-256
- Abhyankar, K., Polakonda, R., Ganapathy, S., & Barrerra, K. (2014) "Model-based simulation systems for adaptive training in time-critical decision making" In NAECON 2014-IEEE National Aerospace and Electronics Conference, June, pp. 149-152
- Abrahams A., Boisot M., Bharathy Gnana (2005) "Simulating the Knowledge Transfer Dilemma: Lessons for Security and Counter-Terrorism", Proceedings of SCSC, Philadelphia, NJ, July
- Amico Vince, Guha R., Bruzzone A.G. (2000) "Critical Issues in Simulation", Proceedings of Summer Computer Simulation Conference, Vancouver, July
- Ankersen, C. (2007) "Civil-Military Cooperation in Post-Conflict Operations: Emerging Theory and Practice", Routledge, London
- Ayers J.B. (2001) "Handbook of Supply Chain Management", CRC Press Boca Raton, USA
- Bachmann, S. D. O. V., & Gunneriusson, H. (2014) "Terrorism and Cyber Attacks as Hybrid Threats: Defining a Comprehensive Approach for Countering 21st Century Threats to Global Risk and Security", The Journal on Terrorism and Security Analysis.
- Balci O., Castilla I., Longo F., Massei M. (2009) "Modeling and Applied Simulation", La Laguna University Press, ISBN 978-84-692-5417-2
- Balci, O. (1994) "Validation, Verification, and Testing Techniques Throughout the Life Cycle of a Simulation Study," Ann. Oper. Res. 53, 121–173
- Bellamy, A. J., & Williams, P. D. (2011) "The New Politics of Protection? Côte d'Ivoire, Libya and the Responsibility to Protect", International Affairs, 87(4), 825-850
- Bernier, F. (2012) "Agility of C2 Approaches and Requisite Maturity in a Comprehensive Approach Context", Proceedings of the 17th ICCRTS. Fairfax, VA, USA
- Binnendijk, H., & Kugler, R. (2004) "Needed-A NATO Stabilization and Reconstruction Force", Defense Horizons, (45), 1
- Blackwell R.D. (1997) "From mind to Market:Reinventing the Retail Supply Chain".Harper Business, NYC
- Bocca, E., Bruzzone, A. G., & Rocca, A. (2006) "Algorithms Devoted to Reproduce Human Modifiers in Polyfunctional Agents", Simulation Series, 38(4), 202
- Bonabeau, E. (2002) "Agent-based modeling: Methods and techniques for simulating human systems", Proceedings of the National Academy of Sciences, 99 (supplement 3), 7280-7287.
- Bossomaier T, A.G. Bruzzone, M. Massei, D. Newth, J. Rosen (2009) "Pandemic dynamic object and reactive agents", Int. Workshop on Modelling and Applied Simulation, Puerto de la Cruz, Tenerife

References (2/9)

- Bossomaier T., Green G.D. (2000) "Complex Systems", Cambridge University Press, Cambridge
- Brabham, D. C. (2009). Crowdsourcing the public participation process for planning projects. Planning Theory, 8(3), 242-262.
- Bruzzone A.G., Massei M., Longo F., Cayirci E., di Bella P., Maglione G.L., Di Matteo R. (2016) "Simulation Models for Hybrid Warfare and Population Simulation", Proc. of NATO Symposium on Ready for the Predictable, Prepared for the Unexpected, M&S for Collective Defence in Hybrid Environments and Hybrid Conflicts, Bucharest, Romania, October 17-21
- Bruzzone A.G., Massei M., Longo F., Nicoletti L., Di Matteo R., Maglione G., Agresta M. (2015) "Intelligent Agents & Interoperable Simulation For Strategic Decision Making On Multicoalition Joint Operations", Proceedings of DHSS, Bergeggi, Italy, September
- Bruzzone, A. G., Massei, M., Poggi, S., Bartolucci, C., & Ferrando, A. (2015). Intelligent agents for human behavior modeling as support to operations. In Simulation and Modeling Methodologies, Technologies and Applications (pp. 119-132). Springer, Cham.
- Bruzzone A.G., Massei M., Agresta M., Poggi S., Camponeschi F., Camponeschi M. (2014) "Addressing strategic challenges on mega cities through MS2G", Proceedings of MAS2014, Bordeaux, France, September
- Bruzzone A.G., Frascio M., Longo F., Chiurco F., Zanoni S., Zavanella L., Fadda P., Fancello G., Falcone D., De Felice F., Petrillo A., Carotenuto P. (2014) "Disaster and Emergency Management Simulation in Industrial Plants", Proceedings of EMSS2014, Bordeaux, France, September
- Bruzzone A.G., Massei M., Agresta M., Poggi S., Camponeschi F., Camponesch M. (2014) "Addressing Strategic Challenges on Mega Cities through MS2G", Proceedings of MAS, Bordeaux, France, September 12-14
- Bruzzone A.G., Massei M., Poggi S., Bartolucci C., Ferrando A. (2014) "Intelligent Agents for Human Behavior Modeling as Support to Operations", Simulation and Modeling Methodologies, Technologies and Applications, Advances in Intelligent Systems and Computing, Springer, London, Vol. 319, pp 119-132
- Bruzzone, A. G., Longo, F., Massei, M., Nicoletti, L., & Agresta, M. (2014) "Safety and security in fresh good supply chain", International Journal of Food Engineering, 10(4), 545-556
- Bruzzone A.G., Massei, M., Longo, F., Poggi, S., Agresta, M., Bartolucci, C., & Nicoletti, L. (2014) "Human Behavior Simulation for Complex Scenarios based on Intelligent Agents", Proceedings of the 2014 Annual Simulation Symposium, SCS, San Diego, CA, April
- Bruzzone A.G., Massei M., Tremori A., Longo F., Nicoletti L., Poggi S., Bartolucci C., Picco E., Poggio G. (2014) "MS2G: Simulation as a Service for Data Mining and Crowd Sourcing in Vulnerability Reduction", Proceedings of WAMS, Istanbul, Turkey, September 16-17
- Bruzzone A.G., Merani D., Massei M., Tremori A., Bartolucci C., Ferrando A. (2013) "Modeling Cyber Warfare in Heterogeneous Networks for Protection of Infrastructures and Operations" Proc.of EMSS, Athens, Greece, September

Simulation Team

References (3/9)

- Bruzzone, A., Mursia, A., & Turi, M. (2013) "Degraded Operational Environment: Integration of Social Network Infrastructure Concept in A Traditional Military C2 System", Proc. of NATO CAX Forum, Rome, Italy, October
- Bruzzone, A. G. (2013) "Intelligent Agent-Based Simulation for Supporting Operational Planning in Country Reconstruction", Int. Journal of Simulation & Process Modelling, 8(2-3), 145-159
- Bruzzone A.G., Longo F., Cayirci E., Buck W. (2012) "International Workshop on Applied Modeling and Simulation", Genoa University Press, Rome, Italy, September
- Bruzzone, A. G., Tremori, A., Tarone, F., & Madeo, F. (2011) "Intelligent agents driving computer generated forces for simulating human behaviour in urban riots", International Journal of Simulation and Process Modelling, 6(4), 308-316.
- Bruzzone, A.G., Tremori, A., Massei, M., (2011), "Adding Smart to the Mix," Modeling, Simulation & Training: the International Defence Training Journal, 3, 25-27
- Bruzzone A.G., Tremori A., Bocca E (2010) "Security & Safety Training and Assessment in Ports based on Interoperable Simulation", I3M2010, Fes, Morocco
- Bruzzone, A. G., & Massei, M. (2010) "Intelligent Agents for Modelling Country Reconstruction Operation", Proc. of the 3rd IASTED African Conference, Gaborone, Vol. 685, No. 052
- Bruzzone A.G., Cantice G., Morabito G., Mursia A., Sebastiani M., Tremori A. (2009) "CGF for NATO NEC C2 Maturity Model (N2C2M2) Evaluation", Proceedings of I/ITSEC2009, Orlando, November 30-December 4
- Bruzzone A.G. (2009) "M&S Projects from Simulation Team with Special Attention to Crisis and Homeland Security Applications", Invited Seminar at IPSC of JRC, Ispra, December
- Bruzzone A.G., Cianci R., Tremori A., Massei M., Tarone F. (2009) "Modeling Green Logistics", Proceedings of ASM2009, Bandung and Kuta, May 2009
- Bruzzone A.G., Cunha G., Rafael M. (2009) "Harbor, Maritime & Multimodal Logistics Modeling and Simulation", La Laguna University Press, ISBN 978-84-692-5416-5
- Bruzzone, A., Cunha, G., Elfrey, P., & Tremori, A. (2009). Simulation for education in resource management in homeland security. Proc. of SCSC, Istanbul, Turkey, July, pp. 231-238
- Bruzzone A.G., Tremori A., Cunha G. (2008) "Intelligence and Security as Framework for Applying Serious Games", Proceedings of SeriGamex 2008, November, Rome

References (4/9)

- Bruzzone, A., Mursia, A., & Turi, M. (2013) "Degraded Operational Environment: Integration of Social Network Infrastructure Concept in A Traditional Military C2 System", Proc. of NATO CAX Forum, Rome, Italy, October
- Bruzzone, A. G. (2013) "Intelligent Agent-Based Simulation for Supporting Operational Planning in Country Reconstruction", Int. Journal of Simulation & Process Modelling, 8(2-3), 145-159
- Bruzzone A.G., Longo F., Cayirci E., Buck W. (2012) "International Workshop on Applied Modeling and Simulation", Genoa University Press, Rome, Italy, September
- Bruzzone, A. G., Tremori, A., Tarone, F., & Madeo, F. (2011) "Intelligent agents driving computer generated forces for simulating human behaviour in urban riots", International Journal of Simulation and Process Modelling, 6(4), 308-316.
- Bruzzone, A.G., Tremori, A., Massei, M., (2011), "Adding Smart to the Mix," Modeling, Simulation & Training: the International Defence Training Journal, 3, 25-27
- Bruzzone A.G., Tremori A., Bocca E (2010) "Security & Safety Training and Assessment in Ports based on Interoperable Simulation", I3M2010, Fes, Morocco
- Bruzzone, A. G., & Massei, M. (2010) "Intelligent Agents for Modelling Country Reconstruction Operation", Proc. of the 3rd IASTED African Conference, Gaborone, Vol. 685, No. 052
- Bruzzone A.G., Cantice G., Morabito G., Mursia A., Sebastiani M., Tremori A. (2009) "CGF for NATO NEC C2 Maturity Model (N2C2M2) Evaluation", Proceedings of I/ITSEC2009, Orlando, November 30-December 4
- Bruzzone A.G. (2009) "M&S Projects from Simulation Team with Special Attention to Crisis and Homeland Security Applications", Invited Seminar at IPSC of JRC, Ispra, December
- Bruzzone A.G., Cianci R., Tremori A., Massei M., Tarone F. (2009) "Modeling Green Logistics", Proceedings of ASM2009, Bandung and Kuta, May 2009
- Bruzzone A.G., Cunha G., Rafael M. (2009) "Harbor, Maritime & Multimodal Logistics Modeling and Simulation", La Laguna University Press, ISBN 978-84-692-5416-5
- Bruzzone, A., Cunha, G., Elfrey, P., & Tremori, A. (2009). Simulation for education in resource management in homeland security. Proc. of SCSC, Istanbul, Turkey, July, pp. 231-238
- Bruzzone A.G., Tremori A., Cunha G. (2008) "Intelligence and Security as Framework for Applying Serious Games", Proceedings of SeriGamex 2008, November, Rome

References   (5/9)

- Bruzzone A.G., A. Scavotti, M. Massei, A. Tremori, (2008) "Metamodelling For Analyzing Scenarios Of Urban Crisis And Area Stabilization By Applying Intelligent Agents" Proceedings of EMSS2008, September 17-19, 2008, Campora San Giovanni (CS),Italy
- Bruzzone A.G. (2008) "Intelligent Agents for Computer Generated Forces", Invited Speech at Gesi User Workshop, Wien, Italy, October 16-17
- Bruzzone, A., Scavotti, A., Massei, M., Tremori, A.(2008) "Metamodelling for analyzing scenarios of urban crisis and area stabilization by applying intelligent agents", Proceedings of 20th European Modeling and Simulation Symposium, Amantea, Italy, September 17-19, pp.521-526
- Bruzzone A.G., Massei M. (2007) "Polyfunctional Intelligent Operational Virtual Reality Agent: PIOVRA Final Report", EDA Technical Report
- Bruzzone A.G., Massei M., M.D., Pierfederici L. (2007) "Layer Modelling for National Homeland Security Crisis", Proceedings of EUROSIW2007, Santa Margherita, Italy, June
- Bruzzone A.G., Massei M.,B.E. (2006) "Simulating Transportation over a Wide Area During a Regional Crisis", Proceedings of SCSC2006, Calgary, Canada, July 30-August 3
- Bruzzone A.G. (2006) "National Crisis Impact on Road Transportation", Proceedings of MAS2006, Bergeggi October
- Bruzzone A.G., Massei M., (2006) "Modelling for Estimating Impact on Road Transportation of Regional Emergencies & Disasters", Proceedings of I3M2006, Barcelona, October
- Bruzzone A.G., Genco P., Bocca E., Pengo L. (2005) "Development of a Model for Evaluating Comparative Evolution of Logistics in Retail", Proceedings of SCSC2005, Philadelphia, July25-28
- Bruzzone A.G., Simeoni S., Bocca E. (2004) "Intelligent Management of a Logistics Platform for Fresh Goods", Proceedings of SCI2004, Orlando FL, July
- Bruzzone A.G., Revetria R. (2003) "VV&A for Innovative Concept Design in New Vessel Simulation and Virtual Prototype", Proceedings of Summer Computer Simulation Conference, SCSC2003, Montreal, Canada, July 20-24
- Bruzzone A.G. (2002) "Web Integrated Logistics and Artificial Intelligence Application for Creating Smart Logistics Networks", Proceeding of SCI2002, Orlando, July
- Bruzzone A.G., Mosca R., Orsoni A., Revetria R. (2002) "Simulation-Based VV&A Methodology for HLA Federations: an Example from the Aerospace Industry", Proceedings of 35th Annual Simulation Symposium, IEEE/SCS, San Diego April
- Bruzzone A.G. , C. Burlando, F.Queirolo (2001) "Simulation as General Support for Validating Data Fusion Algorithms", Proceedings of HMS2001, Marseille, October 15-17

References (6/9)

- Bruzzone, A. G., & Signorile, R. (1999) "Crowd control simulation in Java based environment", Simulation Series, 31, 23-28.
- Bruzzone A.G., Colla G., Mosca R., Scavotti A. (1998) "Simulation as Verification Support for Qualitative Risk Analysis in Industrial Facilities based on Fuzzy Logic", Proceedings of Emergency Management Conference, Boston, 4-9 April
- Bruzzone A.G., Kerckhoffs (1996) "Emergency Management" in the Proceedings of European Simulation Symposium, Simulation in Industry Genoa, Italy, October, Vol. I & II, ISBN 1-56555-099-4
- Bruzzone, A. G., Giribone, P., & Mosca, R. (1996) "Simulation of hazardous material fallout for emergency management during accidents" Simulation, 66(6), 343-356
- Burgherr, P., Giroux, J., & Spada, M. (2015). Accidents in the Energy Sector and Energy Infrastructure Attacks in the Context of Energy Security. European. Journal of Risk Regoulation, 6, 271.
- Capone, A., & Mey, J. L. (2016) "Introduction: Pragmatics, Linguistics, and Sociocultural Diversity", Interdisciplinary Studies in Pragmatics, Culture and Society, Springer International Publishing, NYC
- Cartwright D, Zander A. (1960) "Group Dynamics: Research & Theory", Tavistock, London, UK
- Cayirci E., Bruzzone A.G., Di Bella P., Geller A. (2016) "M&S Requirements for Hybrid Warfare", Technical Report, NATO MSG, Stavanger, Norway
- Chopra, S., Meindl, P., (2001), "Supply Chain Management", Prentice Hall, Upper Saddle River, New Jersey
- Damodaran, S. K., & Couretas, J. M. (2015) "Cyber Modeling & Simulation for Cyber-Range Events", Proceedings of the Conference on Summer Computer Simulation by Society for Computer Simulation International, San Diego, CA, July
- Davis J.R. Jr (2015) "Continued Evolution of Hybrid Threats", The Three Sword Magazine, N. 28, pp.19-25
- De Hoop, T., & Ruben, R. (2010). Insuring against earthquakes: simulating the cost-effectiveness of disaster preparedness. Disasters, 34(2), 509-523.
- Di Bella P. (2015) "Present and Futures Scenarios and Challenges for M&S terms of Human Behavior Modeling", Invited Speech at I3M2015, Bergeggi, Italy, September
- Diaz R., Behr J., Toba A.L., Giles, B., Manwoo N., Longo F., Nicoletti L. (2013). Humanitarian /emergency logistics models: A state of the art overview. Simulation Series, 45 (11), pp. 261-268.
- Diers, A. R., & Donohue, J. (2013) "Synchronizing crisis responses after a transgressi
- Donohue J.M. (1994) "Experimental Design for Simulation", Proceeding of Winter Simulation Conference, Orlando, December
- Eagle, N., & Pentland, A. S. (2006) "Reality mining: sensing complex social systems", Personal and ubiquitous computing, 10(4), 255-268

www.simulationteam.com **32**
Simulation Team

References (7/9)

- Elfrey P. (1982) "The Hidden Agenda", Wiley & Sons, NYC
- Gerasimov V. (2016) "The Value of Science is in the Foresight: New Challenges Demand Rethinking the Forms and Methods of Carrying out Combat Operations ", Military Review, January-February
- Gousty Yvon (1997) "Le Genie Industriel", Presse Universitaire Paris
- Gupta, S., Starr, M. K., Farahani, R. Z., & Matinrad, N. (2016). Disaster management from a POM perspective: mapping a new domain. Production and Operations Management, 25(10), 1611-1637.
- Hamilton John A. Jr., Nash David A., Pooch Udo W. (1996) "Distributed Simulation", CRC Press
- Hill David (1996) "Object-Oriented Simulation", Addison Wesley, Reading MA
- Jennings, H.H. (1987) "Sociometry in Group Relations", Greenwood, Westport, CT
- Jou, Y. T., Lin, C. J., Yenn, T. C., Yang, C. W., Yang, L. C., & Tsai, R. C. (2009). The implementation of a human factors engineering checklist for human–system interfaces upgrade in nuclear power plants. Safety science, 47(7), 1016-1025
- Kalter, F. (2016) "Social Network Analysis in the Study of Ethnic Inequalities", Emerging Trends in the Social and Behavioral Sciences, John Wiley & Sons, NYC, November 29
- Keeton, P., & McCann, M. (2005) "Information Operations, STRATCOM, and Public Affairs", Military Review, 85(6), 83
- Kegley, C. W., & Blanton, S. L. (2015) "World Politics: Trend and Transformation, 2016-2017", Nelson Education, Scarborough, ON, Canada
- Kitchin, R. (2014). The real-time city? Big data and smart urbanism. GeoJournal, 79(1), 1-14
- Lamb C., Stipanovich S. (2016) "Back to Basics on Hybrid Warfare in Europe A Lesson from the Balkans", Joint Force Quarterly, 81, March 29
- Liu, L., Li, Y. B., Wu, D., Zhang, L., & Wang, N. (2016) "Design and Developmental Research on the VV&A of Complex Simulation System", Proc. of MATEC Web of Conferences, Vol. 63
- Magrassi C. (2013) "Education and Training: Delivering Cost Effective Readiness for Tomor-row's Operations", Keynote Speech at ITEC2013, Rome, May 22-24
- Massei M., & Tremori A. (2014) "Simulation of an Urban Environment by Using Intelligent Agents within Asymmetric Scenarios for Assessing Alternative Command and Control Network-Centric Maturity Models", the Journal of Defense Modeling and Simulation, 11(2), 137-153
- Massei, M., Poggi, S., Agresta, M., & Ferrando, A. (2014) "Development Planning Based on Interoperable Agent Driven Simulation", Journal of Computational Science, 5(3), 395-407

References   (8/9)

- Massei, M., Tremori, A. (2010) "Mobile training solutions based on ST_VP: an HLA virtual simulation for training and virtual prototyping within ports", Proc. of International Workshop on Applied Modeling and Simulation, St.Petersburg, Russia, May
- McCuen, J. J. (2008) "Hybrid Wars", Military Review, 88 (2), 107
- McLeod, J., & McLeod, S. (1984) "Simulation of the Society", Simulation, 43(6), 320-323
- Monks J., (1996) "Operation Management", McGraw Hill, NYC
- Montgomery D.C. (2000) "Design and Analysis of Experiments", John Wiley & Sons, New York
- Moreno, Jacob Levy (1951) "Sociometry, Experimental Method and the Science of Society: An Approach to a New Political Orientation". Beacon House, Boston MA
- Mosca R., Giribone P. & Bruzzone A.G. (1995) "AI Techniques to Optimize the distribution of Fire-Fighting Squads during an Accident", Proc. of Simulators International XII, Phoenix, April 9-13
- Mosca R., Giribone P. & Bruzzone A.G. (1996) "Virtual Reality as a Support for Designing Fire-Fighting Standing Operating Procedures", Proc. of Simulation for Emergency Management, New Orleans LA, April 8-11
- Mustapha, K., Mcheick, H., & Mellouli, S. (2013). Modeling and simulation agent-based of natural disaster complex systems. Procedia Computer Science, 21, 148-155.
- Nelson, C. R. (2006) "How Should NATO Handle Stabilisation Operations and Reconstruction Efforts?. Atlantic Council of the United States Policy Paper, Washington DC, September
- Ören T.I., Longo F., (2008) "Emergence, Anticipation and Multisimulation: Bases for Conflict Simulation", Proceedings of the 20th European Modeling and Simulation Symposium, EMSS 2008, pp. 546-555
- Raybourn, E.M. (2012) "Beyond Serious Games: Transmedia for more Effective Training & Education", Proc. DHSS2012, Rome, Italy
- Rehse P., (2004) "CIMIC : Concepts, Definitions and Practice", Heft 136, Hamburg, June
- Rietjens S.J.H., M. Bollen, (2008) "Managing Civil-Military Cooperation", Military Strategy and Operational Art
- Santos, E. E., Santos, E., Wilkinson, J. T., Korah, J., Kim, K., Li, D., & Yu, F. (2011) "Modeling Complex Social Scenarios Using Culturally Infused Social Networks", Proc. of IEEE Int.Conference on Systems, Man, and Cybernetics (SMC), Anchorage, AK, October
- Sarjoughian, H. S., Zeigler, B. P., & Hall, S. B. (2001) "A Layered Modeling and Simulation Architecture for Agent-Based System Development", Proceedings of the IEEE, 89(2), 201-213
- Shapiro J.F. (2001) "Modeling the Supply Chain", Buxbury, Pacific Grove, CA
- Smith, R. (2002) "Counter Terrorism Simulation: A New Breed of Federation", Proceedings of the Spring 2002 Simulation Interoperability Workshop, Orlando, FL, March

References (9/9)

- Sokolowski, J. A., & Banks, C. M. (2011) "Principles of Modeling and Simulation: a Multidisciplinary Approach", John Wiley & Sons, NYC
- Soller, A. (2001) "Supporting Social Interaction in an Intelligent Collaborative Learning System", International Journal of Artificial Intelligence in Education, 12 (1), 40-62
- Song, F., & Zhang, S. (2010). Human factors engineering verification and validation: A case study of a nuclear power plant. In International Conference on Nuclear Engineering, Proceedings, ICONE. January
- Theohary, C. A. (2011) "Terrorist use of the Internet: Information Operations in Cyberspace", DIANE Publishing, Darby, PA
- Tremblay Jean-François (2016) "Chinese Investigators Identify Cause Of Tianjin Explosion". Chemical & Engineering News. February 8, The immediate cause of the accident was the spontaneous ignition of overly dry nitrocellulose stored in a container that overheated
- Weitz, R. (2009) "China, Russia, and the Challenge to the Global Commons", Pacific Focus, 24(3), 271-297.
- Wooldridge, M.; Jennings, N. R. (1995) "Intelligent Agents: Theory and Practice", Knowledge Engineering Review, 10 (2), 115–152
- Zacharewicz G., Frydman C., Giambiasi N. (2008) "G-DEVS/HLA Environment for Distributed Simulations of Workflows", Simulation, Vol.84, N.5, pp 197-213
- Zaharia, M. H., Leon, F., & Atanasiu, G. M. (2009). Increasing Awareness to Disasters by Knowledge Management with Intelligent Agents. In Proceedings of the 10th European Conference on Knowledge Management, Volume One, edited by: Bolisani, E. and Scarso, E., Academic Publishing Limited, Reading, UK, ISBN (pp. 978-1).

References
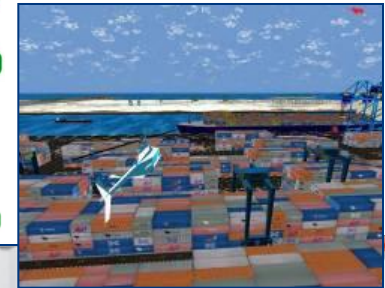
Simulation Team
DIME Genoa University
via Opera Pia 15
16145 Genova, Italy
www.itim.unige.it
Agostino G. BRUZZONE
agostino@itim.unige.it

DIME