

TUTORIAL: INTRODUCTION TO STRATEGIC ENGINEERING

A New Discipline combining Simulation, Big Data, AI/IA to support Strategic Decision Making

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Introduction

Strategic Engineering is a new emerging discipline that strongly relies on Modeling & Simulation (M&S) combined with Big Data Analysis, Artificial Intelligence/Intelligent Agents (AI/IA) and Machine Learning to support Strategic Decision Making. This process is enhanced by the fast evolving capabilities of these methods and technologies related to IoT/loE (Internet of Things/Internet of Everything) that provides huge quantities of data that could be used by simulators if properly processed by intelligent systems. Obviously this discipline requires a robust transdisciplinary approach to address complex problems involving multiple layers. Applications of this discipline cover Industry, Business as well as Defense and Homeland Security and many subjects are actually interested in developing solutions. Consultancy is active in this field as well as major Corporations, but even Small and Medium Size Enterprise and Hi-Tech companies are interested into creating algorithms and models to be framed into this approach.

This Tutorial provides an overview of the foundations of Strategic Engineering and provides a Case Study as example to interactively apply the related concepts into creating an innovative decision support systems that combines simulation, big data and AI.

Tutorial Agenda

The Tutorial introduce the challenging scenario to be addressed as well as the variables to be used for decision and the modeling approach to the different Courses of Actions (COAs). The Tutorials present the development roadmap and critical issues in tailoring architecture, models, interoperability, usability and fidelity concepts for a specific case study. As Scenario is proposed a mixed problem combining Urban Strategic Development by a Public Authority, Sustainability Issues addressing Social, Economic and Environmental Aspects, Private Investments Plans, Industrial Development Plans and Safety and Security Aspects related to different kind of risks and threats (e.g. Natural Disasters, Homeland Security and Crime Development). During the second part of the Tutorial, the class will play the role of a development team addressing the proposed scenario and will be required, finally, to use a Simulator developed for Strategic Engineering applications in order to solve the specific case interacting with a real Decision Maker.

The overall Agenda is summarized as following:

- Introduction on Strategic Engineering
- Critical Issues in developing Models and Simulators for Strategic Engineering
- A Strategic Engineering Case Study: Comprehensive Urban Strategic Development
- Development Team Role Play Game: Identify Critical Aspects, Architecture and Model Requirements
- Decision Support Team Role Play Game: Using Simulation to support Strategic Decision Making
- Debriefing

The class will receive educational material as well as an educational model as well as scientific references.

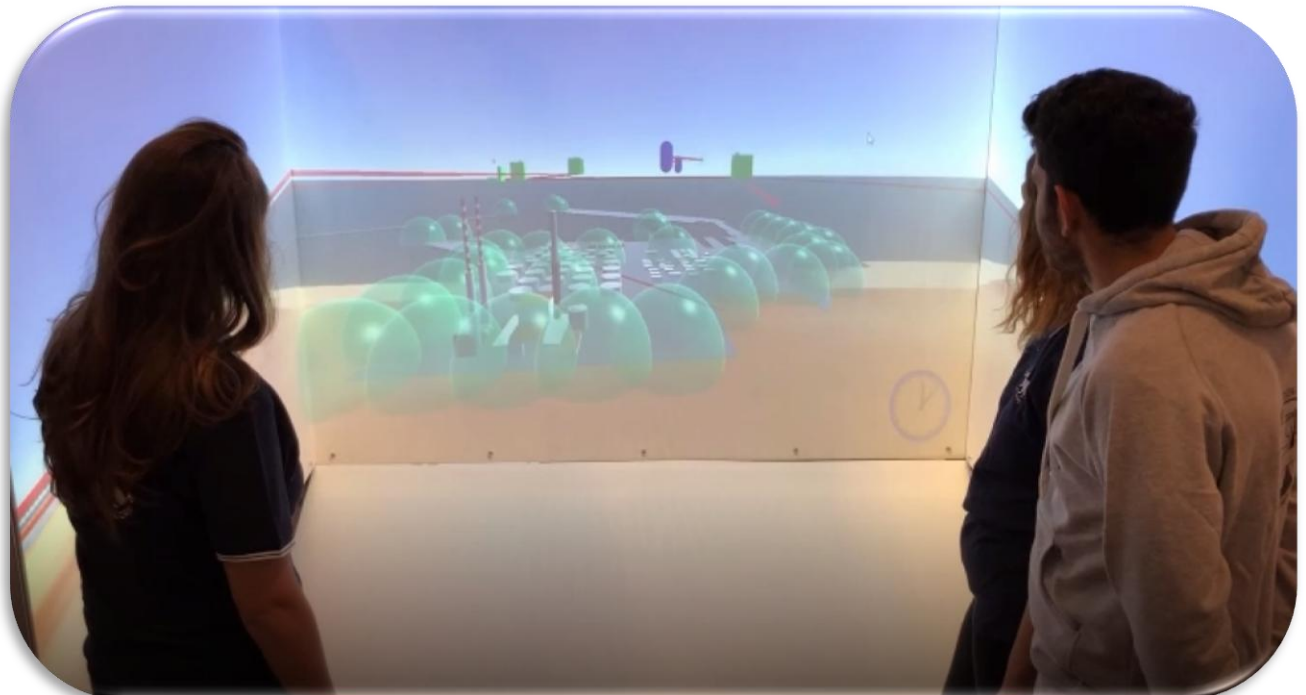
Training Objectives

This Tutorial aims to provide the audience with knowledge to answer following questions:

- What is Strategic Engineering?
- What are Critical Issues in Strategic Decision Making?
- What is the Roadmap to develop Models and Simulators to support Strategic Decision Making?
- How to apply Strategic Engineering to develop a Simulation Solution for Real Case Study?
- How to use Simulation in Strategic Engineering to support a Decision Makers?
- What are the Scientific & Technical References and the Supports to learn more on Strategic Engineering?

Training Audience

This Tutorial is intended for those who do not know what is Strategic Engineering, but would like to learn about how modern M&S techniques could be combined with other techniques and technologies to support Strategic Decision Making. There are not specific pre-requisites for attending the Tutorial, however some basic knowledge about M&S and Computer use will be useful.



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Biographies

Agostino G. Bruzzone began his engineering studies at the Italian Naval Academy with the Faculty of Pisa. After successfully completing this phase, he transferred to Genoa University of Genoa and achieved his doctorship in Mechanical Engineering. Since early '90, he has taught "Theories and Techniques of Automatic Control" and in 1992 he became member of the industrial simulation work group at the ITIM University of Genoa. is currently Full Professor in DIME, University of Genoa, President of the MIPET (International Master Program in Industrial Plant Engineering & Technologies) of Genoa University (ongoing yearly since 2010 and sponsored by major Industries). He is Council Chair of STRATEGOS, the new International MSc in Strategic Engineering of Genoa University.

He is Simulation Team MITIM DIPTM Genoa Director for the McLeod Institute of Simulation Science (an Institution with 28 Centers distributed worldwide: Brazil, China, USA, UK, Italy, France, Germany, Canada, Spain etc.) and he is General Director of M&S Net an International Network involving 34 Centers worldwide. He is founder member and President of the Liophant Simulation and of the Simulation Team. He is the tenth person awarded with the top M&S Lifetime Achievement as member of Simulation Hall of Fame of SCS.

He served as M&S Project Leader for NATO Science and Technology Organization, Center for Maritime Research and Experimentation (CMRE) where he created a new R&D track on Simulation and he is actively involved in many NATO Groups and initiatives.

He has been actively involved in the Scientific Community from several years and served as General Director of the McLeod Institute of Simulation Science (MISS), Associate Vice-President, Executive Vice President and Member of the Board of the SCS (Society for Modelling & Simulation International), President of the Liophant Simulation, President of Simulation Team VicePresident and Member of the Board of MIMOS (Movimento Italiano di Simulazione), General Director and Vice Director of M&S Net, Industrial Relation Chair in SCS Europe, Italian Point of Contact for the ISAG (International Simulation Advisory Group) and Sim-Serv.

He has utilized extensively innovative technologies & simulation in logistics, industrial plants, project management, business, defense, homeland security, autonomous systems, robotics, crisis management, harbors, port terminals, marine domain and sailboat racing sector. He is active in the field of simulator-based applications for industrial plants, developing new methodologies and intelligent system integration techniques.

He acquired extensive experience as a member of International Technical and Organization Committees (i.e. AI Application of IASTED, AI Conference, ESS, ESM, AMS, etc.) and as a General Coordinator of Scientific Initiatives (i.e. General Chair of "Simulation in Industry Conference", "Summer Computer Simulation Conference", I3M, WAMS and "Web Based Simulation Conference", Program Chair of HMS, Guest Editor for several special issues of Int.Journals (e.g."Special Issue of Harbor and Maritime Simulation" and "Supply Chain Simulation"), Member of the Editorial Board of Simulation, Program Chair of "Engineering Application" in WCSS and Track Chair for Manufacturing in SCSC, etc.).

He has written more than 250 scientific papers in International Journals and Conferences, in addition to books, technical/professional reports in partnerships with major companies (e.g. IBM, ENI, Contship, Solvay, CSC, Ford) and agencies (e.g. NASA, European Defence Agency, NATO, National Center for Simulation, Italian MoD, Italian Navy, US Army, DGA).

He has been enrolled in Who's Who, IEEE, IASTED, ANIMP, SCS, MIMOS etc. He teaches "Project Management", "Industrial Logistics" at the University for Bachelor & Master students in many different sectors including Mechanical Engineering, Industrial Engineering, Management Engineering, etc.; He teaches "Modelling & Simulation", "M&S for Biomedical System", HLA and VV&A for the DIMS PhD Program (PhD program in Integrated Mathematical Modelling and Simulation).

Kirill Sinelshchikov is a scientist working in Simulation Team since several years; he graduated in Electronic Engineering in Moscow and completed the Master in Industrial Plant Engineering and Technologies in Genoa University summa cum laude. He has been involved in several projects dealing with advances in Modeling & Simulation, Augmented Reality, Virtual Reality, Blockchain, Human Behavior Modeling, Industrial Plant Engineering, Power Supply. He is author of several papers published in International Journals and Conferences in Europe and North America. He is author of 2 patents on Power Supply. He has coordinated International Team of researchers working in R&D Projects applied to Logistics, Manufacturing, Space and Emergency Management.