



## **STRATEGOS: Master of Science in Modeling for Strategies applied to Engineering, Global Challenges, Operations & Complex Systems**

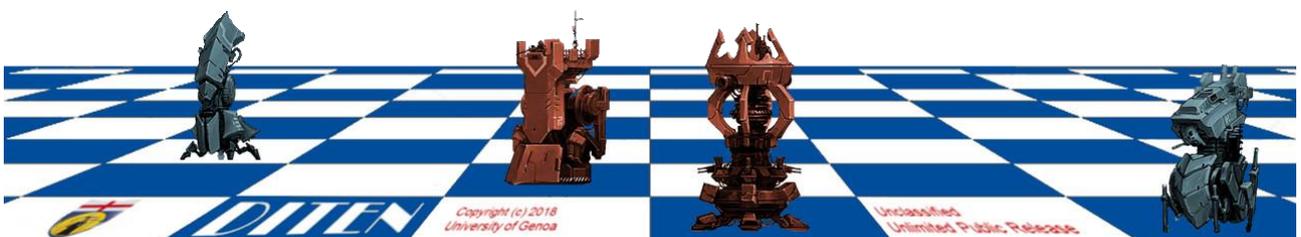
### **Master Science in Engineering from University of Genoa**

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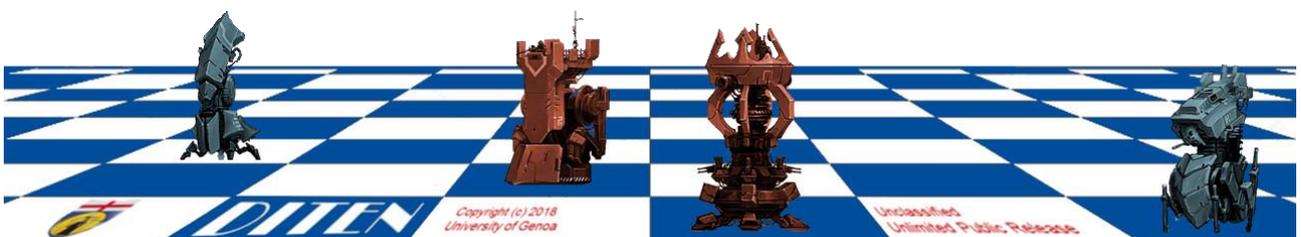
### **STRATEGOS Mission**

**STRATEGOS** is a new initiative devoted to promote quantitative modeling to support decisions by developing a new generation of Engineers able to deal with Strategic Thinking and to support Decision Makers by mastering advance modeling, simulation as well as other enabling technological and scientific areas. Strategic Thinking and Strategy Development have been always key Competitive Factors, given the Complexity of the Reality and of Human Goals. Strategy means ability to deal with a variety of variables, taking into account uncertainty, scalability, extensibility, dependability, multiplayer. Indeed the term Strategy comes from greek combining stratos (army) and agein (leading), so it is pretty clear that it deals with leading resources. In facts, it has been said that "Strategy is the art of good direction" ("La Stratégie est l'art de bien diriger", Jomini, Précis de l'Art de la Guerre, 1838) and this good direction should rely today, in order to be keep competitive, on new supports and models that require a new kind of Engineers able to develop, tune and use them. "We need a philosophy of strategy that contains the seeds of its constant rejuvenation, a way to chart strategy in an unstable environment" is a sentence by Von Clausewitz, published by his wife while almost 200 years ago (Vom Kriege, 1832); this unstable environment as well as the necessity to guarantee constant evolution of strategies is very actual today. Indeed classic definitions say that Strategy relies on effective plans able to achieving success in challenging situations such as business, industry, politics, war, etc. Therefore we should remind the definition of Von Moltke "Strategy is a system of expedients".





It is more than a mere scholarly discipline" as well as "no plan of operations extends with any certainty beyond the first contact with the main hostile force" (Militarische Werke, 1871). These considerations are still valid today , however the Preußischer Generalfeldmarschall does not will to state useless of Strategy, but exactly the opposite: the necessity to adopt a Dynamic and Fluid Strategic Approach that is exactly what we have to face nowadays. Twneety five centuries ago Sun Tzu stated that "Thus do many calculations lead to victory, and few calculations to defeat" (Art of War, Laying Plan, 500 BC) and ancient "calculations" corresponds to modern "modeling and simulation". These considerations make it clear the aim of **STRATEGOS** Master in Engineering, to prepare people to develop these models and solutions and to win competition in a wide spectrum of applications. We can just one statement among millions that confirms the importance of Strategic Engineering: "If you want to grow, find a good opportunity. Today, if you want to be a great company, think about what Social Problem you could solve." (Ma Yun, alias Jack Ma, co-founder and executive chairman of Alibaba, in 2018: Personal Net Worth 42.2 GUSD; Alibaba 462th World Raking, 23.8GUSD Revenues, 6.2GUSD Profits, 56% Growth in Net Revenues, Stocks +15% within a single month). Strategy is nowadays strongly related to Complex Systems involving Quantitative Data and Digital Information. However, to the best of our knowledge, there are few Master Programs, worldwide, specifically dedicated to Strategy Development with solid Modeling and Simulation (M&S), Engineering Foundations and strong Integration with Innovative Enabling Technologies and Architecture related to Information and Communication Technologies (ICT). Indeed, Engineering is not just about designing new Technological Systems and Products, but even to support Identification and Definition of New Strategies devoted to direct Future Developments. These aspects deal with developing New Processes, Solutions and Organizations devoted to achieve the Success respect Strategic Goals. In facts the Operational Lifecycle of Innovative Systems are usually quite long, rich of Uncertainties and strongly affected by many Variables as well as by different potential Scenarios; so a proper approach in Modeling and Analyzing Quantitatively these Elements is fundamental for the Final Success. Understanding these issues is really fundamental and it is necessary to prepare Engineers and Scientists able to create models for supporting decision makers. Despite this importance, up to now, these Strategic Aspects are frequently roughly addressed by traditional approaches and educational practices: often just qualitative approaches or simplified static analysis methodologies are proposed as investigation aid, while, vice versa, today modern M&S, Machine Learning, Big Data, Innovative ICT solutions are potentially more effective in dynamically addressing these Issues.



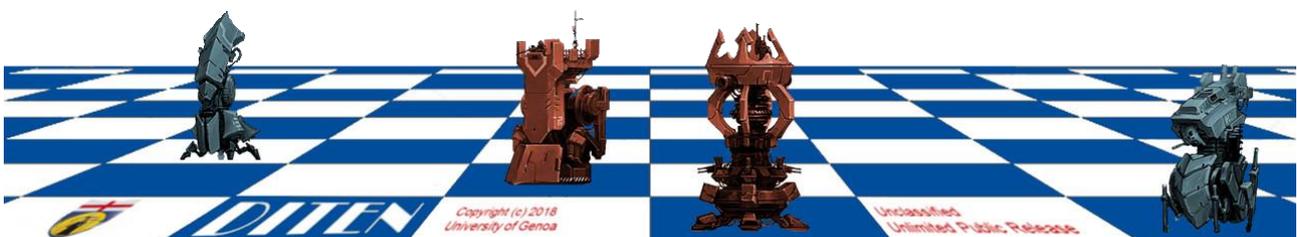


The main goal of this initiative is to set up a new Engineering Master Program which relies on M&S and ICT education and it is able to address Strategic Modeling and Decision Support, providing the Deep Scientific Knowledge as well as the Technical Engineering Skills needed for developing, tailoring and using methodologies for Strategy Definition, Innovative Solution Development and Capability Assessment. Obviously this Engineering Master Program will address Strategy in broad sense with special attention to Applicative Sectors related to Industry, Business and Defense, considering Products, Processes, Events and Scenarios. The Professional Figure that will result as outcome of this Master Program will be able to operate in a variety of application domains (ranging from Manufacturing to Engineering, from Military Sector to Business, from Politics to Personal and Societal Development), being able not only to apply Strategies using the most appropriate Models, but also to gain Requirements for new Methods and to design new Methodologies, Techniques and Instruments for Strategic Planning and Management.

### **STRATEGOS** in Genoa University as a New Engineering Model

**STRATEGOS** is promoted by DITEN Department of Genoa University in cooperation with several Professors and Scientists operating in multi sectors and in strong liason with multiple Laboratories and Research Team. The goal is to create a new International MSc Degree devoted to prepare a new generation of Engineers further reinforcing International Cooperation with Universities, Institutions, Agencies, Research Centers and Leading Industries around the world. In facts, integrating Strategic Analysis, Modeling, Management and ICT Technologies is a well-known need for the contemporary world, which is being addressed by some new valuable Master Programs on Strategy, and Management of Business and Technology. These aspects, initially born in the Business Management Areas, are now offered also in Engineering Master and Master Sciences. Some of these new programs are offered in Europe, and represent an innovative connection between Business/Production and Academia, especially on Scientific and Technological Innovation and Transfer. Few courses within these contents strongly rely on Modeling & Simulation, Operational Management & Research. In this scenario, the **STRATEGOS** MSc course proposed for the University of Genoa intends to bring a strong novelty (Product/System Strategy, based on ICT, Modeling and Simulation and Engineering), and we expect that this should be able to attract Students from Worldwide interested in this subject, considering the prestigious of the Genoa University (established in 1471 AD and ranking among best Universities), the quality of the Faculty and International Relationship with Leading Industries and Top Quality R&D Centers.

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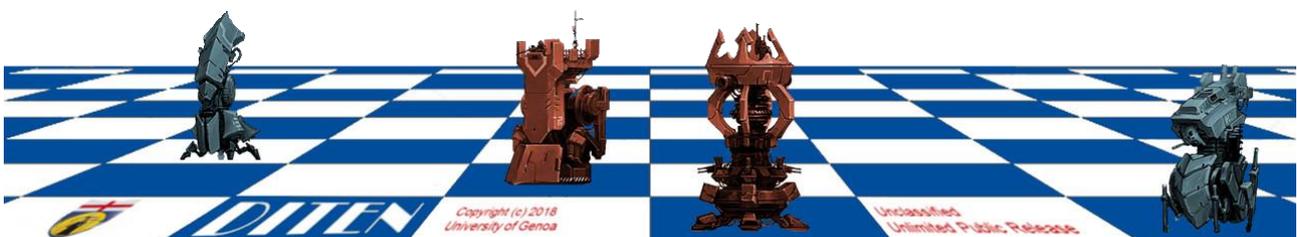
### **STRATEGOS Work Placement Opportunities**

The proposed Master Program, intends to offer a professional engineer profile with a strong foundation in the area of modeling, analysis and strategy planning for products and systems. These competences and skills are expected to be usable in various application fields, both in a local territory and in a much wider area, especially because of the novelty of the educational goals and approach. The expected employment target include large companies, but also Small



Medium Size Enterprises (SMEs), that could benefit from the engineering background of the new employees and by their specific skills and competences on modeling, simulation and methodologies for addressing product/system/service strategies. Indeed these are expected to be ever more relevant, given the typical current uncertainty in several fields in Industrial and Business. Specific competences, that are expected to be useful particularly for advanced business dealing with complex systems and closer to the world of the research, include discrete and continuous modeling, statistical techniques, scenario simulations, enabling ICT technologies. Employment in public/private research and management/administration centers is targeted as well as in Industries and Companies. Hereafter some examples are proposed:

- Support to the Board of Directors: Oil & Gas, Industrial Process Plants & Industries, Major Manufacturing Companies, Strategies for B2B, Strategies for Business to Consumers, Strategies for Communications Services, Strategies in Energy, Strategies in Resilience & Sustainability, Strategies in Investments, Retail, etc.
- Support to the Directors: Strategies on Operations for Major Industries, Strategies in Multi-Project Management in Companies, Operational Level and Grand Tactics devoted to implement Strategies, etc.
- Strategies for Specific Domains: Power, Constructions, Services, Logistics, Marine Sector, Airport Networks and new Air Traffic Control Solutions; New developments enabled by Autonomous Systems; Space & Aerospace (e.g. Micro Satellites and Enabling





Technologies in Aerospace); Underwater Resources (e.g. Impact of advances in Underwater Robotic Systems), etc.

- Support to Defense & Homeland Security: Commander Decision Support in Operational Planning, COA Definition, Quantitative Support to Negotiation and Consensus, Homeland Security, Defense, New Programs & Simulation Based Acquisition, etc.
- Support to Agencies & Governmental Institutions (e.g. EDA, ONU, NATO): Strategies on International Affairs, Consensus, Service to Society, Health Care & Strategies, etc.
- Models for Companies specialized in complex Systems and Plants, etc.
- Design, service and management companies (including Banks and Insurances) requiring scenario simulation and data processing and interpretation, etc.
- Generic companies (e.g., software houses, mechanical electrical and electronic components and systems, etc.) interested in Decision Making and Engineering, especially considering product/system/service strategy. This should concern also SMEs.

### Topics Addressed in **STRATEGOS** MSc Program

We propose a draft degree program consisting of the following courses:

- Computational Methods
- Computer Programming
- Continuous Modeling and Simulation
- Crisis Management
- Cyber Physical Systems
- Cyber Warfare
- Decision Making
- Decision Support Methods
- Discrete Modeling and Simulation
- Game Theory
- Graphics Modeling and Simulation
- Human Behavior Modeling
- Hybrid Warfare
- International Relationships & Geo Models
- Mining and Analyzing Big Data
- Modeling and Design of Complex System
- Modeling and Simulation of Maritime Systems
- Modeling for Monitoring and Diagnostics
- Models and Principles of Economy
- Operational Research
- Probabilistic System Design
- Social Network Modeling
- Software Systems Design Techniques

**STRATEGOS** will include seminars and workshops open to selected audience addressing hot spots (e.g. Social Network Modeling, Demand Forecast, Modelling for B2C, Hybrid Warfare, Human Behavior Modeling, Cyber Warfare, Crisis Management, Anti-Access Area Denial A2AD, Agile C4I, CBRN, etc.) STRATEGOS is an International Master, proposed in English, and open to student from worldwide; optional courses will be offered also in Languages to improve cultural background in soft skills (e.g. Project Management, Team Building) as well as in Language (e.g. Italian, English, Spanish, Chinese, Portuguese).

