**Matteo Morini**
https://mmorini.github.io/

Lugano, 6900
Switzerland
matteo.morini@swarm.org

## Bio

Born 1974, Italian citizen.

## Research interests

Complex Systems, Complex Networks, Agent-Based Modeling, Machine Learning, Computational Economics, Econometrics, Operational Research, Data Mining.

## Education

**2017** PhD in Computer Science, on *"Des Outils pour Comprendre les Dynamiques des Réseaux Sociaux"*. École Doctorale d'Informatique et Mathématiques, Ecole Normale Supérieure, Lyon, France.

**2001** MS in Economics. Università degli Studi, Torino.

## Employment history

### Current positions

**2020-present** Credimi s.p.a., Data Scientist, Milan, Italy.

**2020-present** Yodh Research s.a., Data Scientist, Lugano, Switzerland.

### Previous positions

**2018-2020** Universität Koblenz-Landau, E-Government Research Group at the Institut für Wirtschafts- und Verwaltungsinformatik, postdoctoral researcher, Koblenz, Germany.

**2008-2019** University of Torino, Department of Economics and Statistics, tenured research scientist, Torino, Italy.

**2008** University of Milan, Department of Information Technologies, *"Simulation and Optimization Models for EMS Management"* fellowship, Milano, Italy.

**2004** Exystence Thematic Institute for Complexity and Innovation, member of the Regional Innovation Systems and Complexity WG, ARC Systems Research, Vienna, Austria.

**2001-2008** LABORatorio – Centre for Employment Studies Riccardo Revelli – Collegio Carlo Alberto Foundation, researcher; Institute for Scientific Interchange Foundation Progetto Lagrange scholarship, Moncalieri, Italy.

**2001-2004** EU-FP5 "Penelope Project", leader (Agent-Based supply chain simulator), Torino, Italy; Barcelona, Spain; Saarbrücken, Germany; Athens, Greece.

## Visiting and other positions

**2018** Visiting scholar, National Institute of Informatics, Tokyo, Japan.

**2016** Santa Fe Institute CSSS, Santa Fe, NM.

**2014-present** Member of the board of directors, Vice president (since **2015**), Swarm Development Group.

## Teaching Activities

**2018-present** Computer Science for Socio-economic Research, University of Turin, Italy.

**2016-present** Agent-Based Models, Master in Data Science for Complex Systems, Collegio Carlo Alberto, Turin, Italy.

**2013-2016** Modelling Complex Systems, Master in Economics and Complexity, Collegio Carlo Alberto, Turin, Italy.

## Major Ongoing Collaborations

**2017-present** "Graph-based Semi-Supervised Learning", based at the ENS Lyon, with Sarah De Nigris; graph partitioning by biased random walks.

**2016-present** "Devising Null Models of Lexicostatistics and Glottochronology", based at the Santa Fe Institute, with David Wolpert, William Croft, Richard Blythe, et al.; Agent-Based modelling of language evolution.

**2016-present** "Temporal Evolution of Scientific Communities", based at the ENS Lyon, with Patrick Flandrin; graph-based reconstruction of the history of science, with a scientometrics approach.

**2015-present** "Agent-Based Modeling of Research Hierarchies Driving Scientific Discovery", based at the Harvard Medical School, with Alex Lancaster.

**2015-present** "Japanese Business Networks", based at the ENS Lyon, with Jean-Pascal Bassino; finding evidence of the unbreakable ties and the nature of "Big-6" keiretsu-style industries in Japan.

## Selected publications and presentations

***Books, book chapters, journal articles, working papers and technical reports***

*"Swarms Dynamics Approach to Behavioral Economy: Theoretical Tools and Price Sequences",* Networks and Heterogeneous Media, American Institute of Mathematical Sciences, Volume 15, Number 3, September **2020**, doi:10.3934/nhm.2020022, (with N. Bellomo, S. De Nigris, D. Knopoff, P. Terna)

*"Rethinking Macroeconomics with Endogenous Market Structure"*, Cambridge University Press, ISBN 978-11-0869701-9, **2019** (with M. Mazzoli, P. Terna)

*"Personal Income Tax Reforms: a Genetic Algorithm Approach"*, European Journal of Operational Research, Volume 264, Issue 3, pp. 994-1004, doi:10.1016/j.ejor.2016.07.059, Elsevier Publishing, **2018** (with S. Pellegrino)

*"Business Cycle in a Macromodel with Oligopoly and Agents' Heterogeneity: an Agent-Based Approach"*, Italian Economic Journal, available online, doi:10.1007/s40797-017-0058-y, Springer, **2017** (with P. Terna, M. Mazzoli)

*"Detecting Global Bridges in Networks",* Journal of Complex Networks, Volume 4, Issue 3, pp. 319-329, doi:10.1093/comnet/cnv022, **2016**, Oxford University Press (with P. Jensen, T. Venturini, A. Vespignani, M. Jacomy, J.-P. Cointet, P. Mercklé, M. Karsai, E. Fleury)

*"Agent-based Dynamic Optimization of Fiscal Systems", in "Agent-based Models of the Economy. From Theories to Applications",* Palgrave Macmillan, London, **2015** (with S. Pellegrino)

*"The Emergence of Cooperation", in "Agent-based Models of the Economy. From Theories to Applications",* Palgrave Macmillan, London, **2015**

*"Agent-based Models of the Economy. From Theories to Applications",* Palgrave Macmillan, London, ISBN 978-1-349-67406-0, **2015** (with R. Boero, M. Sonnessa, P. Terna)

*"Employment Security and Employability: A Contribution to the Flexicurity Debate",* European Foundation for the Improvement of Living and Working Conditions Report, ISBN 978-92-897-0828-9, **2008** (with F. Devicienti, A. Maida, A. Poggi, P. Vesan)

*"Modelli per la complessità, la simulazione ad agenti in economia"*, il Mulino, Bologna, ISBN 978-88-15-10988-0, **2006** (with P. Terna, R. Boero, M. Sonnessa, eds.)

*Conference Papers*

**Sep 23-28 2018:** CSS2018, Thessaloniki, Greece, *"Graph Semi-Supervised Learning through Bridgeness-Biased Random Walks"*, (with S. De Nigris)

**Feb 6-8, 2018:** BIFI2018, Complexity, Networks and Collective Behaviour, Zaragoza, Spain, *"A Simple Model of Coevolution for Macroscopic and Microscopic Levels"*, (with S. De Nigris)

**Nov 29-31, 2017:** Complex Networks 2017, Lyon, France, *"The Evolution of Japanese Business Networks in ASEAN Countries Since the 1960s"*, in Complex Networks & Their Applications VI, Proceedings of Complex Networks **2017** , pp. 1065 -1075 (with J.-P. Bassino, P. Jensen)

**Jul 10-13, 2017:** IC2S2, International Conference on Computational Social Science, Gesis, Leibniz Institute for the Social Sciences, Cologne, Germany, "*A Mesoscale Description of Networks' Dynamics Through Continuous Partitioning"* (with P. Jensen, E. Fleury, M. Karsai)

**May 11, 2017:** Trajectoires et dynamiques des réseaux: approches quantitatives, ENS Lyon, France, *"Emergence d'un nouveau domaine scientifique : les ondelettes"* (with P. Jensen, P. Flandrin)

**Jul 30-Aug 3, 2016:** SwarmFest2016, University of Vermont, Burlington, VT, *"Agent-Based Modeling of Research Hierarchies Driving Scientific Discovery"* (with A. Lancaster)

**Jul 11-13, 2016:** Complex Networks, From Theory to Interdisciplinary Applications, Satellite meeting of StatPhys26, Marseille, France, *"Detecting Global Bridges in Networks"*

**Nov 25, 2015:** Journée Data Science - Social Science, Science des données et humanités numeriques, Institut des Systèmes Complexes Paris-Île de France (ISC-PIF), Paris, France, *"Bridgeness and Scientometrics"*

**Oct 29-Nov 1, 2015:** The Computational Social Sciences Society of the Americas, CSSSA 2015, Santa Fe, NM, *"A Simple Model of Coevolution for Macroscopic and Microscopic Levels"* (with P. Jensen)

**Sep 15-18, 2015:** Historical Network Research Conference, Lisbon, Portugal, *"The Evolution of Japanese Business Networks in ASEAN Countries since the 1960s"* (with J.-P. Bassino, P. Jensen)

**July 10-12, 2015:** SwarmFest2015, University of South Carolina, Columbia, SC, *"A Simple Model of Coevolution for Macroscopic and Microscopic Levels"* (with P. Jensen)

**September 22-26, 2014:** ECCS14, European Conference on Complex Systems, Lucca, Italy, *"Bridgeness: A Novel Centrality Measure to Detect Global Bridges"* (with P. Jensen, T. Venturini, A. Vespignani, M. Jacomy, J.-P. Cointet, P. Mercklé, M. Karsai, E. Fleury)

**June 29-July 1, 2014:** SwarmFest2014, University of Notre Dame, IN, *"Taking Genetic Algorithms and Personal Income Tax Reforms One Step Beyond: Enter Agents"* (with S. Pellegrino)

**June 2, 2014:** TopoNets'14, NetSci'14 Satellite, University of California, Berkeley, CA, *"A New Measure to Detect Global Bridges"* (with P. Jensen, T. Venturini, A. Vespignani, M. Jacomy, J.-P. Cointet, P. Mercklé, M. Karsai, E. Fleury)

**July 8-9, 2013:** SwarmFest2013, Complex Adaptive Systems Laboratory, UCF Orlando, FL, *"Doing more with less? An Agent-Based Tale of Emergency Medical Services and Shrinking Budgets in Piedmont, Italy"* (with M. Bortolin)

**October 23-24, 2009:** NAACSOS 2009, North American Association for Computational Social and Organizational Sciences, Arizona State University, Tempe, AZ, *"Minimal Group Phenomena in Harvesting Games"* (with U. Merlone, P. Terna)

## Editorial/Refereeing activities

Winter Simulation Conference, Computational Social Science Society of the Americas, KI - Künstliche Intelligenz, Simulation&Games, SIMULTECH, SwarmFest, Mind&Society, Italian Journal of Public Economics, Bureau for Research in Innovation, Complexity and Knowledge (BRICK), Journal of Economic Interaction and Coordination.

## Languages

Italian: native language
English and French: full professional proficiency
Spanish: limited working proficiency

## CS skills

I develop novel algorithms and metrics (graph-based semi-supervised learning through enhanced diffusion regimes, and bridging measures of network centralities are examples of the former and the latter, respectively) from the ground up, and also am a proficient user of the standard python (pandas, numpy, scipy, scikit-learn, keras, ...) Machine Learning libraries. In developing network-based algorithms, metrics and visualizations, I am familiar and rely on Python, Java, C, C++, Objective C, Fortran; (non-)relational database solutions (e.g. Postgre/MySQL, MongoDB); other useful tools include R, Gephi, the Swarm, Repast, Mason libraries; I prefer working under UNIX major flavours, GNU/Linux in particular. In coding Agent-Based Models, I tend to start prototyping in NetLogo, then move to a middle-ground object-oriented language (Python being my current choice), if needed also implementing distributed computing (e.g. Spark), eventually down to a lower-level language (C++). I also happen to take care of data ETL myself, in calibrating and validating. I also had experienced working with the SAS suite (Base/STAT) on legacy data projects.

**My Erdős Number is 3,** by the route Erdős-Chung Graham-Vespignani detailed below:

*1.* Y. Alavi et al., *Highly Irregular Graphs, JGT, 1987*
*2.* D.V. Krioukov at al., *The Workshop on Internet Topology (WIT) Report, ACM SIGCOMM CCR, 2007*
*3.* P. Jensen et al., *Detecting Global Bridges in Networks, JCN, 2015*