Curriculum Vitae: Manuel Sebastian Mariani

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1 Personal Data

Born: 25th December 1990 in Rome, Italy
Nationality: Italian
Residence: Switzerland
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2 Academic positions

- **04.2022–present: Research Group Leader.**
  Department of Business Administration, University of Zurich.
  - Co-PI of SNSF grant: *"How individual-level choices drive collective consumer behavior in social networks*", Swiss National Science Foundation project 100013-207888 (596,983CHF; 08.2023–06.2027).
  - *[04.2022–12.2024]:* Affiliated with the University Research Priority Program "URPP Social Networks" (2013–2024), where I also served as the **project leader** for one of the program's three pillars: "Networks and Organizations"

- **09.2017–01.2024: Research Associate Professor in Complexity Science.**
  Institute of Fundamental and Frontier Sciences, University of Electronic Science and Technology of China, UESTC, Chengdu, China.
  [06.2021–01.2024]: Visiting professorship.
  [09.2017–05.2021]: On-site professorship.
- **11.2017–03.2022: Senior Research Associate.**
  University Research Priority Program “URPP Social Networks", University of Zurich.
- **01.2017–07.2017: Visiting researcher**
  Computer Science Department, Shenzhen University, China.

3 Education

- **12.2013—10.2017: PhD in Physics (University of Fribourg, Switzerland).**
  Thesis title: The temporal dimension of ranking in complex networks: algorithms, models, and applications.
  Thesis supervisor: Prof. Yi-Cheng Zhang.
- **09.2011—07.2013: Master in Physics (University Sapienza of Rome, Italy)**
  Final grade: 110/110 cum laude.
  Thesis title: Impact of density variations on out-of-equilibrium glasses.
  Thesis supervisor: Prof. Giorgio Parisi.
- **09.2008—09.2011: Bachelor in Physics (University Sapienza of Rome, Italy).**
  Final grade: 110/110 cum laude.
  Thesis title: Quantum entanglement: consequences and applications.
  Thesis supervisor: Prof. Massimo Testa.

4 Research

4.1 Summary of research achievements

I have developed an interdisciplinary research agenda at the intersection of complexity science, network theory, behavioral modeling, and information systems. My work has spanned physical, ecological, and social systems, and it is reflected in 39 peer-reviewed publications, including *PNAS, Nature Communications, Physics Reports, National Science Review, and Communication Physics*. Below, I list my main achievements:

- *Complexity in physical systems.* In my early work, I developed simulation-based and analytic tools based on replica theory to explain the behavior of ultrastable glasses (*PNAS* 2015).

- *Complexity in information systems.* I have led foundational studies on algorithmic bias in network-based rankings, developed correction techniques, and co-authored a highly cited review (*Physics Reports* 2017).

- *Complexity in economic and ecological systems.* I’m an expert on network nestedness, having led a widely cited interdisciplinary review (*Physics Reports* 2019) and co-developed a micro-level optimization model to identify key nodes for ecosystem stability (*Communications Physics* 2024). Through new clustering and ranking algorithms, my works contributed to redefining nestedness from a global to a local property of complex ecosystems.

- *Complexity in social dynamics.* My ongoing research focuses on social tipping and behavioral change. I have introduced new techniques to identify network seeding strategies, integrating behavioral data with computational models (*National Science Review* 2024; under review at *Nature Human Behaviour*). I also led a recent review on network mechanisms behind success in social systems (*Nature Communications* 2024), which bridges complexity science, sociology, and managerial perspectives on success.

These contributions have been supported by major Swiss grants and active collaborations across Europe, China, and the US.

4.2 Selected grants and awards

- **08.2025–07.2028: Co-PI and proposal lead**, "Advancing social sensing to trigger the large-scale diffusion of environmental action", Swiss National Science Foundation project (376,782CHF).
- **01.2023–06.2027: Co-PI and proposal lead**, "How individual-level choices drive collective consumer behavior in social networks", Swiss National Science Foundation project 100013-207888 (596,983CHF).
- **04.2022:** Promoted from senior research associate to research group leader at the Department of Business Administration of the University of Zurich.
- **01.2021:** Appointed as the **project leader** for one of the three pillars ("Networks and Organizations") of the URPP Social Networks excellence cluster of the University of Zurich.
- **01.2020–12.2020: PI**, Cooperation grant by the Shanghai University of Finance and Economics (7,000RMB, approx. 1,000CHF).
- **05.2019–05.2021: Co-applicant and proposal lead**, "Influencer and Innovator Identification in Temporal Networks", Swiss National Science Foundation project 200021-182659 (348,169CHF).
- **01.2018–12.2020: PI**, Identification of influencers and innovators in temporal networks and its applications", UESTC research start-up grant (125,000RMB, approx. 17,500CHF).
- **11.2017–03.2022:** Post-doctoral fellowship by the University Research Priority Program Social Networks, an interdisciplinary excellence cluster at the Department of Business Administration, University of Zurich, Switzerland.
- **07.2016: EPS Young Researcher Award**. Support for travel and attendance in the SigmaPhi 2017 conference.
- **10.2014 09.2017: Proposal co-writer**, "Node heterogeneity and temporal patterns in growing complex networks", Swiss National Science Foundation project 200020-156188 (292,305CHF; PI: Prof. Yi-Cheng Zhang).
- **12.2013–10.2017:**, PhD fellowship at the University of Fribourg.
- **09.2012:** Selected for the excellence program for the top-15 Master students at the Physics department of the Sapienza University of Rome.
- **09.2010:** Selected for the excellence program for the top-30 Bachelor students at the Physics department of the Sapienza University of Rome.

4.3 Publication list

(*) marks papers where I am the corresponding author.

Papers under review.

3. (*) R. Tanase, R. Algesheimer, **M. S. Mariani**, Integrating behavioral experimental findings into dynamical models to inform social change interventions. Under review in ***Nature Human Behaviour***, 2nd round. Pre-print: [SSRN, arxiv].

2. (*) E. Hitz, M. Feng, R. Tanase, L. Lazzaro, R. Algesheimer, **M. S. Mariani**, The amplifier effect of artificial agents in social contagion. Under review in ***PNAS Nexus***, 1st round. Pre-print: [SSRN, arxiv].

1. Y. Huang, S. Xu, L. Lü, A. Zaccaria, **M. S. Mariani**, Uncovering key predictors of high-growth firms via explainable machine learning. Under review in ***Information Processing and Management***, 2nd round. Pre-print: arxiv.

Published papers

39. (Review,*) **M. S. Mariani**, F. Battiston, E.-A. Horvat, G. Livan, F. Musciotto, D. Wang, Collective dynamics behind success. ***Nature Communications*** 15 (1), 10701 (2024).

38. (Letter to Editor) G. Vaccario, S. Xu, **M. S. Mariani**, M. Medo, The quest for an unbiased scientific impact indicator remains open. ***Proceedings of the National Academy of Sciences (PNAS)*** 121 (41) e2410021121 (2024).

37. L. Costantini, F. Laio, **M. S. Mariani**, L. Ridolfi, C. Sciarra, Forecasting national CO2 emissions worldwide. ***Scientific Reports***, 14: 22438 (2024).

36. W. Zhang, J. Cao, **M. S. Mariani**, Z.-Z. Wang, M. Zhou, W. Chen, H. Liao, Uncovering milestone papers: A network diffusion and game theory approach. ***Journal of Informetrics*** 18: 101545 (2024).

35. **M. S. Mariani**, D. Mazzilli, A. Patelli, D. Sels, F. Morone, Ranking species in complex ecosystems through nestedness maximization. ***Communications Physics*** 7 (1), 102 (2024).

34. D. Mazzilli, **M. S. Mariani**, F. Morone, A. Patelli, Equivalence between the fitness-complexity and Sinkhorn-Knopp algorithms. ***Journal of Physics: Complexity*** 5, 015010 (2024).

33. (*) F. Zhou, L. Lü, J. Liu, **M. S. Mariani**, Beyond network centrality: Individual-level behavioural traits for predicting information superspreaders in social media. ***National Science Review***, 11: 7 (2024).

32. (*) S. Xu, **M. S. Mariani**, L. Lü, L. Napolitano, E. Pugliese, A. Zaccaria, Citations or dollars? Early signals of a firm's research success. ***Technological Forecasting and Social Change*** 201, 123208 (2024).

31. D. Laudati, **M. S. Mariani**, A. Zaccaria, L. Pietronero, The different structure of economic ecosystems at the scales of companies and countries, ***Journal of Physics: Complexity*** 4, 025011 (2023).

30. Y. Ye, S. Xu, **M. S. Mariani**, L. Lü, Forecasting nations' gross domestic product from patent data. ***Chaos, Solitons and Fractals*** 160, 112234 (2022).

29. W. Jia, **M. S. Mariani**, L. Lü, Y. Dai, T. Jiang, Towards Detecting Previously Undiscovered Interaction Types in Networked Systems, ***IEEE Internet of Things Journal***, 9(20), 20422-20430 (2022).

28. (*) M. Cui, **M. S. Mariani**, M. Medo, Algorithmic bias amplification via temporal effects: The case of PageRank in evolving networks, ***Communications in Nonlinear Science and Numerical Simulation*** 104, 106029 (2022).

27. M. Medo, **M. S. Mariani**, L. Lü, The fragility of opinion formation in a complex world, ***Communications Physics***, 4(1), 1-10 (2021).

26. J. Wang, S. Xu, **M. S. Mariani**, L. Lü, The local structure of citation networks uncovers expert-selected milestone papers, ***Journal of Informetrics*** 15: 101220 (2021).

25. (*) S. Xu, **M. S. Mariani**, L. Lü, Modeling the dynamics of firms' technological impact. ***Chinese Physics B*** 30, 120517 (2021).

24. M. Medo, **M. S. Mariani**, L. Lü, The simple regularities in the dynamics of online news impact, ***Journal of Computational Social Science*** 1–18 (2021).

23. (*) **M. S. Mariani**, M. Palazzi, A. Solé-Ribalta, J. Borge-Holthoefer, C. J. Tessone, Absence of a resolution limit in in-block nestedness, ***Communications in Nonlinear Science and Numerical Simulation*** 94, 105545 (2021).

22. (Perspective, *) **M. S. Mariani**, L. Lü, Network-based ranking in social systems: three challenges, ***Journal of Physics: Complexity*** 1, 011001 (2020).

21. S. Xu, **M. S. Mariani**, L. Lü, M. Medo, Unbiased evaluation of ranking metrics reveals consistent performance in science and technology citation data, ***Journal of Informetrics*** 14: 101005 (2020).

20. S. Xu, Q. Zhang, L. Lü, **M. S. Mariani**, Recommending investors for new startups through diffusion on tripartite networks, ***Information Sciences*** 515, 103-115 (2020).

19. (*) **M. S. Mariani**, M. Medo, F. Lafond, Early identification of important patents: Design and validation of citation network metrics, ***Technological Forecasting and Social Change*** 146: 644-654 (2019).

18. (*) H. Liao, M.-K. Liu, **M. S. Mariani**, M. Zhou, X. Wu, Temporal similarity metrics for latent network reconstruction: The role of time-lag decay, ***Information Sciences*** 489: 182192 (2019).

17. M. Medo, A. Zeng, Y.-C. Zhang, **M. S. Mariani**, Optimal timescale of community detection in growing networks, ***New Journal of Physics*** 21: 093066 (2019).

16. (Review, *) **M. S. Mariani**, Z.-M. Ren, J. Bascompte, C. J. Tessone, Nestedness in complex networks: observation, emergence, and implications, ***Physics Reports*** 813: 190 (2019).

15. (*) S. Zhang, M. Medo, L. Lü, **M. S. Mariani**, The long-term impact of ranking algorithms in growing networks, ***Information Sciences*** 488, 257271 (2019).

14. (*) F. Zhou, L. Lü, **M. S. Mariani**, Fast influencers in complex networks, ***Communications in Nonlinear Science and Numerical Simulation*** 74, 69–83 (2019).

13. (*) F. Iannelli, **M. S. Mariani**, I. Sokolov, Influencers identification in complex networks through reaction-diffusion dynamics, ***Physical Review E*** 98, 062302 (2018).

12. M. Medo, **M. S. Mariani**, L. Lü, Link Prediction in Bipartite Nested Networks, ***Entropy*** 20 (10), 777 (2018).

11. (*) J.-H. Lin, C. J. Tessone, **M. S. Mariani**, Nestedness maximization in complex networks through the fitness-complexity algorithm, ***Entropy*** 20 (10), 768 (2018).

10. A. Solé-Ribalta, C. J. Tessone, **M. S. Mariani**, J. Borge-Holthoefer, Revealing In-Block Nestedness: Detection and benchmarking, ***Physical Review E*** 97, 062302 (2018).

9. (*) Z.-M. Ren, **M. S. Mariani**, M. Medo, Y.-C. Zhang, Randomizing growing networks with a time-respecting null model, ***Physical Review E*** 97, 052311 (2018).

8. (*) G. Vaccario, M. Medo, N. Wider, **M. S. Mariani**, Quantifying and suppressing ranking bias in a large citation network, ***Journal of Informetrics*** 11: 766-782 (2017).

7. (Review, *) H. Liao, **M. S. Mariani**, M. Medo, Y.-C. Zhang, M.-Y. Zhou, Ranking in evolving complex networks, ***Physics Reports*** 689: 1-54 (2017).

6. (*) R.-J. Wu, G.-Y. Shi, Y.-C. Zhang, **M. S. Mariani**, The mathematics of non-linear metrics for nested networks, ***Physica A*** 460: 254-269 (2016).

5. (*) **M. S. Mariani**, M. Medo, Y.-C. Zhang, Identification of milestone papers through time-balanced network centrality, ***Journal of Informetrics*** 10: 1207-1223 (2016).

4. M. Medo, **M. S. Mariani**, A. Zeng, Y.-C. Zhang, Identification and impact of discoverers in online social systems, ***Scientific Reports*** 6: 34218 (2016).

3. (*) **M. S. Mariani**, M. Medo, and Y.-C. Zhang, Ranking nodes in growing networks: When PageRank fails, ***Scientific Reports*** 5: 16181 (2015).

2. (*) **M. S. Mariani**, A. Vidmer, M. Medo, Y.-C. Zhang, Measuring economic complexity of countries and products: which metric to use?, ***European Physical Journal B*** 88.11: 1-9 (2015).

1. **M. S. Mariani**, G. Parisi, and C. Rainone. Calorimetric glass transition in a mean-field theory approach, ***Proceedings of the National Academy of Sciences (PNAS)*** 112.8: 2361-2366 (2015).

4.4 Selected presentations

I have delivered 22 invited or contributed talks at international conferences in network science (*NetSci*), complex systems (*Conference on Complex Systems (CCS)*), marketing science (*EMAC, Marketing Science*), social network analysis (*INSNA Sunbelt, European Conference in Social Networks*); 7 talks in workshops and local conferences; and 20+ seminars in research groups and faculties across Europe and China. Below, I provide a selection of 10 invited or contributed talks; the full list of talks is available under request.

- 07.2025: **Invited talk**, “Complexity in Economics and Finance" conference, satellite of the StatPhys conference, Rome, Italy. *Title: Unlocking the micro-macro link in social contagion theory and experiments*.

- 06.2024: **Contributed talk**, INSNA (International Network for Social Network Analysis) Sunbelt conference 2024, Edinburgh, Scotland. *Title: Unlocking the micro-macro link: Integrating behavioral experimental findings into dynamical models to inform social change interventions*.

- 06.2023: **Invited talk**, “Influencer Marketing" special session at the Marketing Science conference, Miami, Florida, USA. *Title: When and how individual behavioural models benefit seeding policies.*

- 05.2023: **Invited talk**, “Influencer Marketing" special session at the EMAC (European Marketing Academy) 2023 Annual conference, Odense, Denmark. *Title: When and how individual behavioural models benefit seeding policies.*

- 07.2022: **Contributed talk**, NetSci 2022 (Virtual) conference. *Title: When and how can models of collective social phenomena benefit from data-driven individual-level models?*

- 09.2020: **Invited talk**, “Quantifying Success" satellite of the NetSci 2020 (Virtual) conference. *Title: Predicting collective success from individual behavior.*

- 06.2020: **Invited talk**, “Social Dynamics" special session at the ISMS (Virtual) Marketing Science conference. *Title: The wisdom of the few: Predicting success by tracking key individuals.*

- 09.2019: **Contributed talk**, European Conference in Social Networks, Zurich, Switzerland. *Title: Searching for individuals whose early adoptions signal future success in a nationwide socio-economic system.*
- 05.2019: **Contributed talk**, NetSci 2019 conference, Burlington, Vermont, USA. *Title: Discoverers of success in temporal networks: identification, socio-economic characterization, and predictive applications.*
- 09.2016: **Invited talk**, "Social and Economic Change as a Complex Dynamical System", satellite of the 2016 Conference on Complex Systems, Amsterdam, Netherlands. *Title: The essential role of time in information filtering.*

5 Teaching

5.1 Summary of teaching activities

Over the past several years, I have taught and developed Master-level courses at the University of Zurich, including Social Dynamics, Machine Learning for Marketing, Agent-Based Modelling, and Network Analytics. These courses consistently received high student evaluations (e.g., 6.0/6.0 in 2023 for Social Dynamics; 5.7/6.0 in 2024 for Machine Learning). In addition, I have supervised PhD students in both Switzerland and China, supporting their research and professional development in business research (in Zurich) and complexity science (in China).

5.2 List of courses

Master-level courses taught as Lecturer at the Faculty of Business, Economics, and Informatics of the University of Zurich (language: English):

- *Social Dynamics: Understanding how new products and behaviors spread in society* (Seminar).
  Fall 2022, 2023, 2024. High course ratings: 6.0/6.0 (2023); 5.7/6.0 (2022).
- *Machine Learning - A non-technical introduction with applications to Marketing*
  Fall 2023, 2024. High instructor ratings: 5.7/6.0 (2024).
- *Agent-based modelling for informatics, business and economics*.
  Fall 2018, Spring 2019, 2020, 2021. High instructor ratings: 6.0/6.0 (2019).
- *Network Analytics for informatics, business and economics*.
  Spring 2018.

Bachelor-level and Master-level courses taught as Teaching Assistant at the Physics Department, Fribourg University (language: French):

- Thermodynamics (Bachelor, Spring 2017); Computational Physics Atelier (Master, Spring 2017; project supervision); Quantum Statistical Mechanics (Master, Fall 2016); Theoretical Physics Atelier (Master, Fall 2015; seminars); Advanced Physics Labs (Bachelor, 2015–2017; supervision of laboratory experiments for physics students); Physics Labs (Bachelor, Fall 2014; laboratory experiments for medicine students).

5.3 Supervision experience

Supervised **PhD students** (graduation year in parentheses).

- Department of Business Administration, University of Zurich. Supervision of *Maria Poiaganova (ongoing); Fei Wang (ongoing); Lorenzo Costantini (visiting student; 2023); Mingwei Wang (visiting student; 2022)*.
- UESTC, Chengdu. Supervision of *Fang Zhou (2024), Shuqi Xu (2022)*.

Supervised **Master students** (graduation year in parentheses).

- Department of Business Administration, University of Zurich. Supervision of *Leo Lengwiler (2025), Baoming Li (2024), Safa Gharaviroudsari (2024), Severin Venetz (2024), Wenya Zou (2024), Zhuhong Zou (2023)*.
- Informatics Department, University of Zurich. Co-supervision of *Zehra Turgut (2023), Silvan Wehrli (2021), Seungwoo Han (2021)*.
- Physics Department, Sapienza University of Rome. Co-supervision of *Dario Laudati (2022)*.
- UESTC, Chengdu. Supervision of *Jingjing Wang (2020), Wenlong Luo (2020), Ye Yucheng (2020), Zhihao Qiu (2020), Shilun Zhang (2019), Fang Zhou (2019), Shuqi Xu (2019)*.

Supervised **Bachelor students** (graduation year in parentheses).

- Department of Business Administration, University of Zurich. Supervision of *Janic Stürzinger (2024), Michael Vultier (2024), Leo Lengwiler (2022), Linnea Halden (2022), Linda Yang (2022), Clemens van den Bergh (2022), Karla Juric (2022), Corinne Herrmann (2020), Fabio Calise (2020)*.

Student research assistants:

- Department of Business Administration, University of Zurich. Supervision of *Jingshu Han (2024), Wenya Zou (2023)*.

6 Academic service

6.1 Review activities

- Reviewer for **scientific journals**:
  - Interdisciplinary: *PNAS; Nature Communications; Scientific Reports; PLOS ONE*.
  - Management science: *Research Policy; Technological Forecasting and Social Change*.
  - Computer and information science: *Swarm and Evolutionary Computation; Knowledge-based Systems; Information Sciences; Journal of Informetrics; Scientometrics*.
  - Natural sciences: *Communications Physics; Methods in Ecology and Evolution; EPJ Data Science; Chaos, Solitons and Fractals; Physica A; Entropy; Journal of Physics Communications; Journal of Computational and Applied Mathematics.*
- External examiner for **PhD theses** at the Department of Physics, University of Fribourg: *Ruijie Wang (2023); Leilei Wu (2023)*.
- Reviewer of **grant proposals for national research foundations**: *UK Economic and Social Research Council (ESRC); National Science Center of Poland; South Africa's National Research Foundation (NRF)*.
- Reviewer (program committee member) for **international conferences**: *Conference on Complex Systems* (2024–present), *NetSci* (2020, 2022–present), *NetSciX* (2023–present), *International Conference on Complex Networks and their Applications* (2019–present).

6.2 Professional activities and memberships

- Co-organizer of the second and third edition of the **Swiss Symposium on Network Science** (03.2018 and 10.2018), local chapter of the Network Science Society.
- **2025–present:** Member of the Complex System Society.

- **2025–present:** Member of the Marketing, Digital Transformation, and Entrepreneurship group of the University of Zurich (Switzerland).
- **2017–present:** Member of the Swiss Center for Data and Network Sciences (Fribourg, Switzerland).
- **2017–2024:** Member of the Marketing Group Zurich (University of Zurich and ETH Zurich, Switzerland).

6.3 Selected outreach activities

- "Collective dynamics behind success" (***Nature Communications***, 2024) was covered by several press releases: Eurekalert! by the American Association for the Advancement of Science (AAAS), *Challenging our intuitions: How social forces shape success*, reshared by popular news aggregators such as Phys.org, Scienmag, msn.com.
- Project leader interview included in the booklet: *"URPP Social Networks 2013–2024: Findings and Future Perspectives"* (2024).
- 05.2024: **Poster** presented at the URPP Final Event of the University of Zurich aimed at the general public. *Title: Bridging the micro-macro divide in social contagion*.
- "Beyond network centrality: Individual-level behavioural traits for predicting information superspreaders in social media" (***National Science Review***, 2024) was covered by several press releases: Eurekalert! by the American Association for the Advancement of Science (AAAS), *A new algorithm to predict information superspreaders in social media*, reshared by popular news aggregators such as Phys.org, msn.com.
- "The fragility of opinion formation in a complex world" (***Communications Physics***, 2021) was covered by several press releases and Swiss media: Keystone-SDA National Press Agency of Switzerland, *Wie aus anfänglich guten Absichten Falschinformationen entstehen*, reshared by popular Swiss media such as Swissinfo.ch, Bieler Tagblatt, and Blick; University of Fribourg press release, *Misinformation: physics to the rescue*, 21.05,2021.

7 Languages and interests

Languages. Fluent in Italian, English, French; currently learning German (B2 level).
Interests. Intercultural exchange, reading, sports (swimming, running), dancing.