

Michael C. Zargham, Ph.D.

CEO and Chief Engineer, Dynamical Systems Group

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Google Scholar: 1,658 citations, h-index 19 (Oct 2026)

Curriculum Vitae, October 2026

PROFILE

I am a systems engineer and researcher working at the intersection of operations research, control theory and institutional economics. My research began with distributed optimization and resource allocation in networks. It moved through generalized dynamical systems and the design of economic and institutional mechanisms, and now centers on the assurance of complex socio-technical systems, with model-based systems engineering as its principal method. Since 2017 my principal institutional base has been Dynamical Systems Group, the engineering firm I founded, where I lead applied research in computational modeling and simulation. I also teach and hold research roles in academic, policy and open-source communities.

EDUCATION

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| 2014 | Ph.D., Electrical and Systems Engineering , University of Pennsylvania
Dissertation: <i>Fast, Distributed Optimization Strategies for Resource Allocation in Networks</i> .
Advisors: Ali Jadbabaie and Alejandro Ribeiro. GRASP Laboratory. |
| 2010 | M.S.E., Electrical and Systems Engineering , University of Pennsylvania |
| 2008 | B.E. , Thayer School of Engineering, Dartmouth College
Robotics and control. Capstone design project: <i>Autonomous Robot for Ground Penetrating Radar Surveys</i> (YETI polar rover). |
| 2007 | A.B., Engineering Sciences , Dartmouth College
Senior honors thesis: <i>Adoption of Household Solar Systems</i> . |

PROFESSIONAL APPOINTMENT

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| 2017 – present | CEO and Chief Engineer , Dynamical Systems Group (formerly BlockScience)
Research and systems engineering firm centered on resource allocation under uncertainty in systems of interacting agents. Core methods are released as open source and applied through professional services. As Chief Engineer, holds design authority for the firm's technical work. <ul style="list-style-type: none">– Modeling and simulation. Generalized dynamical systems models (cadCAD) of market, voting, incentive and resource-allocation mechanisms, including prize competitions and challenges, stress-tested with scenario ensembles against prespecified metrics (parameter selection under uncertainty).– Deployed decision systems. Took a robust-control pricing rule from design simulation through production deployment, monitoring and stakeholder governance over about three years (presented at PyData NYC 2023).– Digital twins of organizations. Models organizations as dynamical systems scoped to specific capabilities and missions, to evaluate courses of action across many plausible futures.– Engineering assurance. Requirements as behavioral envelopes; reproducible engineering records (declaration, execution, evidence, realization) under continuous analysis, with verification automated and validation reserved for accountable engineers. Built on open-source implementations of engineering standards (SysML v2, OpenMBEE). Clients span humanitarian, industrial and public-sector research settings (e.g. Danish Red Cross, Bosch). Funding includes a USAF AFWERX SBIR Phase I award (2021). |
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ACADEMIC APPOINTMENTS AND RESEARCH AFFILIATIONS

- 2019 – 2023 **Affiliated Researcher**, Research Institute for Cryptoeconomics, WU Vienna University of Economics and Business
- Mathematical foundations for designing economic and institutional mechanisms.
 - With J. Shorish, developed *Generalized Dynamical Systems*, a general formalism for computational decision problems under constraints. Applications include reachability and controllability analysis for systems whose agents' objectives are unknown to the designer.
- 2014 **Postdoctoral Researcher**, University of Pennsylvania
- 2008 – 2014 **Graduate Research Fellow**, University of Pennsylvania
- Supported by three Multidisciplinary University Research Initiative (MURI) grants:
- ONR, *Next Generation Network Science*
 - ARO, *Evolution of Cultural Norms and Dynamics of Socio-Political Change*
 - AFOSR, *Control Science for Next Generation Sensing*

RESEARCH LEADERSHIP

- 2025 – present **Fellow**, The European Decentralisation Institute
- Policy research on data and AI sovereignty; lead author of the Institute's 2026 policy brief.
- 2021 – present **Research Director**, Metagov
- Research on the governance of automation and organizational intelligence, including knowledge organization infrastructure (with Prof. Ellie Rennie).

TEACHING

- 2022 – 2024 **Visiting Lecturer**, IE University Law School, Law, Policy and Technology executive program (spring term, annually)
- Spring 2023 **Visiting Lecturer**, Carnegie Mellon University, Heinz College
- 94-896 Governing Many Worlds*, co-developed and co-taught with Joshua Tan.
- Spring 2015 **Lecturer**, University of Pennsylvania
- ESE 605: Modern Convex Optimization* (graduate course).

RESEARCH SOFTWARE AND OPEN SOURCE

Established research software

- **cadCAD**, originator and lead architect, 2017 – present. Simulation built on generalized dynamical systems, for designing and analyzing socio-technical and multi-agent systems through models. It is in active use across academia and industry and is now governed by the cadCAD Foundation.
- **OpenMBEE** (open model-based engineering environment of NASA JPL origin), Maintainer, 2026 – present. Version-control methods for engineering models, including classifying and resolving merge conflicts in Flexo MMS. Requirements traceability protocols combining RDF and Git.

Research prototypes (2026)

- **ADCS lifecycle demonstrator**: requirements as behavioral envelopes, with traceability of evidence and attestation (SysML v2).
- **CAIE specification** (with Humane Intelligence): contextual AI evaluation as an executable specification, bound to systems and quality engineering standards.
- **knowledgecomplex**: Python package for typed simplicial complexes.

Peer-reviewed journal articles

- J1 A. Clark, A. Mihailov, **M. Zargham**. “Complex Systems Modeling of Community Inclusion Currencies.” *Computational Economics* 64(2):1259–1294, 2024. (Earlier version: *WU working paper series*.)
- J2 E. Rennie, **M. Zargham**, J. Tan, L. Miller, J. Abbott, K. Nabben, P. De Filippi. “Toward a Participatory Digital Ethnography of Blockchain Governance.” *Qualitative Inquiry* 28(7):837–847, 2022.
- J3 K. Nabben, **M. Zargham**. “Permissionlessness.” *Internet Policy Review* 11(2), 2022.
- J4 H. M. Kim, M. Laskowski, **M. Zargham**, H. Turesson, M. Barlin, D. Kabanov. “Token Economics in Real Life: Cryptocurrency and Incentives Design for Insolar’s Blockchain Network.” *IEEE Computer* 54(1):70–80, 2021.
- J5 F. Fritsch, J. Emmett, E. Friedman, R. Kranjc, S. Manski, **M. Zargham**, M. Bauwens. “Challenges and Approaches to Scaling the Global Commons.” *Frontiers in Blockchain* 4:578721, 2021.
- J6 Z. Zhang, **M. Zargham**, V. M. Preciado. “On Modeling Blockchain-Enabled Economic Networks as Stochastic Dynamical Systems.” *Applied Network Science* 5(1):19, 2020.
- J7 **M. Zargham**, A. Ribeiro, A. Ozdaglar, A. Jadbabaie. “Accelerated Dual Descent for Network Flow Optimization.” *IEEE Transactions on Automatic Control* 59(4):905–920, 2014.
- J8 V. M. Preciado, **M. Zargham**, C. Enyioha, A. Jadbabaie, G. J. Pappas. “Optimal Resource Allocation for Network Protection Against Spreading Processes.” *IEEE Transactions on Control of Network Systems* 1(1):99–108, 2014.

Refereed conference proceedings

- C1 **M. Zargham**. “Derivations, Not Just Simulations: Teaching Applied Mathematics with Scientific Python.” *Proceedings of the 25th Python in Science Conference (SciPy 2026)*, forthcoming.
- C2 **M. Zargham**. “Formalizing Document Assurance: A Topological Framework for Verification, Validation, and Human Accountability.” *INCOSE International Symposium* 36(1):1501–1514, 2026.
- C3 E. Rennie, K. Nabben, **M. Zargham**, J. Potts, B. A. Coco, L. Miller, M. Green. “Building the Loop: The Role of Ethnography in Artificial Organisational Intelligence.” *Ethnographic Praxis in Industry Conference Proceedings* 2025(1):223–235.
- C4 K. Nabben, **M. Zargham**. “The Ethnography of a ‘Decentralized Autonomous Organization’ (DAO): De-mystifying Algorithmic Systems.” *Ethnographic Praxis in Industry Conference Proceedings* 2022(1):74–97.
- C5 **M. Zargham**, K. Paruch, J. Shorish. “Economic Games as Estimators.” *Mathematical Research for Blockchain Economy (MARBLE 2020)*, Springer, pp. 125–142. (Earlier version: *WU working paper series*, 2020.)
- C6 **M. Zargham**, J. Shorish, K. Paruch. “From Curved Bonding to Configuration Spaces.” *IEEE International Conference on Blockchain and Cryptocurrency (ICBC)*, 2020. (Earlier version: *WU working paper series*, 2019.)
- C7 R. Tutunov, **M. Zargham**, A. Jadbabaie. “On Convergence Rate of Accelerated Dual Descent Algorithm.” *IEEE Conference on Decision and Control (CDC)*, pp. 179–184, 2014.
- C8 **M. Zargham**, A. Ribeiro, A. Jadbabaie. “Discounted Integral Priority Routing for Data Networks.” *IEEE GLOBECOM*, pp. 1993–1998, 2014.
- C9 **M. Zargham**, V. M. Preciado. “Worst-Case Scenarios for Greedy, Centrality-Based Network Protection Strategies.” *Conference on Information Sciences and Systems (CISS)*, 2014.

- C10 V. M. Preciado, **M. Zargham**, D. Sun. “A Convex Framework to Control Spreading Processes in Directed Networks.” *CISS*, 2014.
- C11 V. M. Preciado, **M. Zargham**, C. Enyioha, A. Jadbabaie, G. Pappas. “Optimal Vaccine Allocation to Control Epidemic Outbreaks in Arbitrary Networks.” *IEEE CDC*, pp. 7486–7491, 2013.
- C12 **M. Zargham**, A. Ribeiro, A. Jadbabaie. “Accelerated Dual Descent for Constrained Convex Network Flow Optimization.” *IEEE CDC*, pp. 1037–1042, 2013.
- C13 **M. Zargham**, A. Ribeiro, A. Jadbabaie. “Accelerated Backpressure Algorithm.” *IEEE GLOBECOM*, pp. 2269–2275, 2013.
- C14 V. M. Preciado, **M. Zargham**. “Traffic Optimization to Control Epidemic Outbreaks in Metapopulation Models.” *IEEE GlobalSIP*, pp. 847–850, 2013.
- C15 **M. Zargham**, A. Ribeiro, A. Jadbabaie. “Network Optimization under Uncertainty.” *IEEE CDC*, pp. 7470–7475, 2012.
- C16 J. Oh, **M. Zargham**, X. Su, A. Jadbabaie. “Game Theoretic Analysis of Customer Subscription Decisions in Networks with Positive Externality.” *IEEE CDC*, pp. 2678–2683, 2012.
- C17 **M. Zargham**, A. Ribeiro, A. Jadbabaie. “A Distributed Line Search for Network Optimization.” *American Control Conference (ACC)*, pp. 472–477, 2012.
- C18 E. Wei, **M. Zargham**, A. Ozdaglar, A. Jadbabaie. “On Dual Convergence of the Distributed Newton Method for Network Utility Maximization.” *IEEE CDC-ECC*, 2011.
- C19 A. Jadbabaie, A. Ozdaglar, **M. Zargham**. “A Distributed Newton Method for Network Optimization.” *IEEE CDC*, 2009.

Book chapters

- B1 **M. Zargham**, I. Ben-Meir. “Protocols and Institutions.” In *Cryptoeconomic Theory*, World Scientific, 2026, pp. 157–179.
- B2 V. M. Preciado, **M. Zargham**, C. Enyioha, C. Nowzari, S. Han, M. Ogura, et al. “Bio-inspired Framework for Allocation of Protection Resources in Cyber-Physical Networks.” In *Principles of Cyber-Physical Systems: An Interdisciplinary Approach*, 2020.

Working papers and preprints

- W1 J. K. Hollek, **M. Zargham**, M. Kumar. “Ontology-Based Contextual AI Evaluations (OB-CAIE) Methodology.” [arXiv:2610.00529](https://arxiv.org/abs/2610.00529), 2026.
- W2 N. Schneider, K. Nabben, R. Tamari, **M. Zargham**. “Online Governance Surfaces and Attention Economies.” OSF Preprints, 2025.
- W3 D. Sisson, K. Nabben, I. Ben-Meir, **M. Zargham**. “Data Mesh Architecture: Interoperability, Co-Operation, and Co-Regulation.” SSRN, 2024.
- W4 D. Lessa Bernardineli, I. Ben-Meir, **M. Zargham**, J. Hackel. “Min-Maxing Complexity on Digital Infrastructure Mechanisms through Occam’s Razor and Ashby’s Law of Requisite Variety.” [SSRN 4865894](https://ssrn.com/abstract=4865894), 2024.
- W5 K. Nabben, H. Wang, **M. Zargham**. “Decentralised Governance for Autonomous Cyber-Physical Systems.” [arXiv:2407.13566](https://arxiv.org/abs/2407.13566), 2024.
- W6 J. Tan, T. Merk, S. Hubbard, et al. (incl. **M. Zargham**). “Open Problems in DAOs.” [arXiv:2310.19201](https://arxiv.org/abs/2310.19201), 2023.
- W7 **M. Zargham**, I. Ben-Meir. “Method for Functional Decomposition of Organizations and Their Environments.” [SSRN 4606672](https://ssrn.com/abstract=4606672), 2023.
- W8 **M. Zargham**, J. Shorish. “Block Diagrams for Categorical Cybernetics.” [SSRN 4569037](https://ssrn.com/abstract=4569037), 2023.
- W9 **M. Zargham**, E. Alston, K. Nabben, I. Ben-Meir. “What Constitutes a Constitution?” Zenodo, [doi:10.5281/zenodo.10609125](https://doi.org/10.5281/zenodo.10609125), 2023.
- W10 **M. Zargham**, J. Shorish. “Generalized Dynamical Systems Part I: Foundations.” Working Paper Series, Research Institute for Cryptoeconomics, WU Vienna, 2022.

- W11 J. Shorish, M. Stephenson, **M. Zargham**. “A Practical Theory of Fungibility.” Working Paper Series, Research Institute for Cryptoeconomics, WU Vienna, 2021.
- W12 M. Laskowski, **M. Zargham**, H. Turesson, M. Barlin, D. Kabanov, E. Dhaliwal. “Evidence Based Decision Making in Blockchain Economic Systems: From Theory to Practice.” [arXiv:2001.03020](https://arxiv.org/abs/2001.03020), 2020.
- W13 S. Voshmgir, **M. Zargham**. “Foundations of Cryptoeconomic Systems.” Working Paper Series No. 1, Research Institute for Cryptoeconomics, WU Vienna, 2019.
- W14 **M. Zargham**, Z. Zhang, V. M. Preciado. “A State-Space Modeling Framework for Engineering Blockchain-Enabled Economic Systems.” [arXiv:1807.00955](https://arxiv.org/abs/1807.00955), 2018.

Other scholarly outputs

- E. Alston, A. Case, **M. Zargham**. “Path Dependence: An Uncomfortable Institutional Design Axiom.” Conference abstract (Workshop on the Ostrom Workshop), 2024. Digital Library of the Commons, [hdl:10535/11015](https://hdl.handle.net/10535/11015).
- **M. Zargham**, K. Nabben. “Aligning ‘Decentralized Autonomous Organization’ to Precedents in Cybernetics.” *MIT Computational Law Report*, 2023 (editorially reviewed). (*Earlier version: SSRN 4077358*, 2022.)
- A. M. Elmessiry, R. F. Maaghul, J. W. Bayrd II, J. C. Maaghul, **M. Zargham**. “System and Method for Educational Offering Staking and Token Architecture.” US Patent Application 16/400,804, 2019.

SELECTED TALKS

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| 2026 | <p><i>Requirements, Evidence and Attestation Traceability with Python and Flexo MMS</i>. JAXA MBSE/MCE Workshop, Tsukuba, Japan (invited), Jun 2026; repeated for the Open Source Architect Community (Open Teams), Oct 2026. [VIDEO] [SLIDES]</p> <p><i>Formalizing Document Assurance: A Topological Framework for Verification, Validation, and Human Accountability</i>. INCOSE International Symposium, Yokohama, Jun 2026. [SLIDES]</p> <p><i>Derivations, Not Just Simulations: Teaching Applied Mathematics with Scientific Python</i>. SciPy 2026, Minneapolis, Jul 2026. [VIDEO] [SLIDES]</p> <p><i>Principles, Pitfalls and Challenges of Open Source Software Ecosystems</i>. INCOSE International Workshop, MBSE track, Torrance, CA, Jan 2026; NASA JPL Open Systems Development Forum, Pasadena, Feb 2026.</p> |
| 2025 | <p>Keynote, <i>Protocols & Infrastructures: DePIN from an Institutional Economics meets Cyber-Physical Systems Lens</i>. Breaking DePIN, Zurich, Sep 2025.</p> <p>Panel chair, <i>Model Based Institutional Development</i>, and paper <i>Organizational Navigation Via Institutional Statements</i> (with C. Frantz). IASC 2025 (International Association for the Study of the Commons), UMass Amherst, Jun 2025.</p> <p>Global Challenges Action Innovation Partnership (IAAI GloCha) series at the United Nations, New York, 2024 – 2025:</p> <ul style="list-style-type: none"> – Panelist, official side event of the 2025 ECOSOC Partnership Forum, <i>Global Challenges Action Innovation, Emerging Technologies & the Power of Partnerships</i>, Permanent Mission of Austria to the UN, co-hosted with The Bahamas, Feb 2025. [VIDEO] – Workshop talk, <i>The Role of Common Knowledge in Coordination</i>, UN Headquarters, Dec 2024. |
| 2024 | <p><i>Systems Engineering Is the Worst Method for Managing Complex Systems, Except for All the Other Ways</i> (vision talk) and <i>Crafting Reliable Rules: RAI Case Study</i>. Mathematics for Governance Design Workshop, Edinburgh, Oct 2024.</p> <p><i>The Economics of Data and Systems Engineering</i>. Open Source Science (NumFOCUS) Economics Interest Group, Jun 2024. [VIDEO]</p> |

	<i>From Viable Organizations to Viable Ecologies</i> . Metaphorum (Viable System Model community), Jan 2024. [VIDEO]
2023	<i>Crafting Reliable Rules with Robust Control</i>. PyData NYC, Nov 2023. Keynote, <i>Decentralized Science: Returning to an Anti-rival View of Research</i>. ATARCA Final Seminar (EU Horizon 2020), Mar 2023. Research summit panel with L. Lessig and A. Pentland. DAO Harvard (Belfer and Safra Centers), Cambridge, MA, Apr 2023.
2022	Keynote, <i>Formal Methods for Design and Analysis of Automated Agreements</i>. MARBLE 2022. <i>Algorithms as Policy</i>. Funding the Commons, New York, Jun 2022; What's Governing Web3? research symposium, RMIT, Melbourne, Dec 2022. [VIDEO]
2018 – 2021	<i>A Survey of Cryptoeconomic Research at BlockScience</i> (with J. Shorish). Research Institute for Cryptoeconomics, WU Vienna, Sep 2021 (also a seminar there in 2019). <i>Macroeconomic Modeling and Simulation of Cryptoeconomic Systems Using cadCAD</i>. World Bank, May 2021. <i>Blockchain, Network Science and Dynamical Systems</i>. Fields Institute for Research in Mathematical Sciences, Toronto, Oct 2019. [VIDEO] <i>Introduction to Complex Systems</i>. Cryptoeconomic Systems Summit, MIT Media Lab, Oct 2019. [VIDEO] <i>Towards Best Practices in Token Engineering</i>, INFORMS Annual Meeting, 2018; <i>Blockchain & Business Analytics</i>, INFORMS Business Analytics Conference, Baltimore, Apr 2018. Keynote, <i>Creating Interconnected Collaborative Communities</i>. Future of Trust Summit, Ridderzaal, The Hague, Sep 2018. [VIDEO] <i>On Engineering Economic Systems</i>. Warren Center for Network & Data Sciences, University of Pennsylvania, Apr 2018. <i>A comprehensive archive of more than 150 talks, panels and podcasts since 2018 is available on request.</i>

MENTORSHIP

Thesis co-advising

- **Zixuan Zhang**, master's thesis, University of Pennsylvania, co-advised with Prof. Victor M. Preciado, 2018 – 2020. Joint publication: *On Modeling Blockchain-Enabled Economic Networks as Stochastic Dynamical Systems* (*Applied Network Science*, 2020).

Informal doctoral mentorship and research collaboration (joint publications listed)

- **Krzysztof Paruch** (doctoral researcher, WU Vienna): *Economic Games as Estimators* (MARBLE 2020); *From Curved Bonding to Configuration Spaces* (ICBC 2020).
- **Andrew Clark** (doctoral researcher, University of Reading): *Complex Systems Modeling of Community Inclusion Currencies* (*Computational Economics*, 2024).
- **Kelsie Nabben** (doctoral researcher, RMIT University): *Permissionlessness* (*Internet Policy Review*, 2022); *The Ethnography of a DAO* (EPIC 2022).

SERVICE TO RESEARCH AND SCIENTIFIC INFRASTRUCTURE

2022 – present	Advisory Council Member , NumFOCUS (Executive Director Hiring Committee, 2025)
2021 – present	Board Member , Metagov
2023	Program committee , PyData NYC
2023	Organizer , AI Palace research unconference (Bückeburg, Germany; hosted by Metagov)

ADVISORY AND TRUSTEE APPOINTMENTS

2026 – present	Advisor , Humane Intelligence
2023 – present	Trustee , The Superset Trust (Guernsey purpose trust; designed its terms with the other founding trustees; Declaration of Trust , March 2023)
2023 – 2025	Scientific Advisory Board , Active Inference Institute
2016 – 2018	Machine Learning Advisor , Spark Technology Center (Apache Spark advisory council)

PRIOR INDUSTRY EXPERIENCE

2014 – 2017	Cross MediaWorks / Cadent , Director, Data Science (2016 – 2017); Senior Data Scientist (2015 – 2016); Data Scientist (2014) – Built and led deployed decision systems for media operations across a portfolio of companies, using control theory, signal processing, optimization, machine learning and distributed systems. – Grew the team from one data scientist to a full scrum team.
2005 – 2017	Techtel Corporation , Research Partner (2009 – 2017, part-time, concurrent with doctoral research and later roles); Data Scientist (2005 – 2009, during undergraduate and graduate study) – Developed control-theoretic models of reputation and market feedback; one was implemented extensively by SAP.

AWARDS

2023	Corporate Stewardship Award , NumFOCUS
2008	Faculty Award for Academic Excellence , Thayer School of Engineering, Dartmouth College (highest academic record in the B.E. program)
2008	Corporate Collaboration Council Engineering Design Prize , Thayer School of Engineering (B.E. capstone, YETI autonomous polar rover team)
2007	Tau Beta Pi

PROFESSIONAL MEMBERSHIPS

INFORMS (since 2014) · INCOSE (since 2025) · IEEE (since 2007)