

Luis M. Rocha

George J. Klir Professor of Systems Science
Department of Systems Science and Industrial Engineering
Thomas J. Watson College of Engineering and Applied Science, Binghamton University (SUNY)
P.O.Box 6000, Binghamton NY 13902-6000
Phone (607) 777-5934
E-Mail: rocha@binghamton.edu
<http://informatics.indiana.edu/rocha/>

A. Professional Preparation

Instituto Superior Técnico, Lisbon, Portugal	Mechanical Engineering	B.S.	1988
Instituto Superior Técnico, Lisbon, Portugal	Systems Engineering	M.S.	1990
State University of New York, Binghamton	Systems Science	Ph.D.	1997
Los Alamos National Laboratory, NM, USA	Complex Systems	PostDoc	1998

B. Appointments

2021--Present	<u>George J. Klir Professor of Systems Science</u> , Binghamton University, SUNY.
2020-2021	<u>Visiting Professor</u> , Binghamton University, SUNY
2019--Present	<u>Director</u> , Center for Social and Biomedical Complexity, Indiana University
2019-Present	<u>Visiting Professor</u> , NOVA School of Business and Economics, Portugal
2018-Present	<u>Advisory Council Member</u> Indiana University Network Science Institute
2017-Present	<u>Director</u> NSF-NRT Interdisciplinary Training Program in Complex Networks and Systems
2017-Present	<u>Visiting Professor</u> , Center for Theoretical Physics, Aix-Marseille University, France
2016-2018	<u>Visiting Professor</u> , Neuroscience & Clinical Sciences, Fundação Champalimaud, Portugal
2013-Present	<u>Professor</u> , Luddy School of Informatics, Computing, and Engineering, Indiana University
2008-Present	<u>Director</u> , Complex Networks & Systems track, Informatics PhD Program, Indiana University
2002-Present	<u>Principal Investigator</u> , Instituto Gulbenkian de Ciencia, Portugal
2005-2015	<u>Director</u> , Computational Biology Collaboratorium, and co-director of Ph.D Program in Computational Biology, Instituto Gulbenkian de Ciencia, Portugal
2004-2013	<u>Associate Professor</u> , School of Informatics & Computing, Indiana University
1998-2002	<u>Team Leader</u> of the Complex Systems Modeling Team, Los Alamos National Laboratory
1999-2004	<u>Technical Staff Member</u> , Los Alamos National Laboratory
1995-1997	<u>Adjunct Professor</u> , State University of New York, Binghamton, Dep. of Systems Science
1990-1991	<u>Graduate Research Assistant</u> , Laboratorio Nacional de Engenharia Civil, Portugal

C. Publications

Most related to proposed project

1. A. Gates, Correia, R.B., X. Wang, L.M. Rocha [2021]. "The effective graph reveals redundancy, canalization, and control pathways in biochemical regulation and signaling." *Proceedings of the National Academy of Sciences*. **118** (12) e2022598118. PMC8000424.
2. Simas, T., R.B Correia and L.M. Rocha [2021]. The distance backbone of complex networks. *Journal of Complex Networks*. In Press. arXiv:2103.04668
3. R.B. Correia, I.B Wood, J. Bollen, L.M. Rocha [2020]. "Mining social media data for biomedical signals and health-related behavior". *Annual Review of Biomedical Data Science*, 3:1. DOI: 10.1146/annurev-biodatasci-030320-040844. NIHMSID:1596369.
4. A. Gates, A. and L.M. Rocha [2016]. "Control of complex networks requires both structure and dynamics". *Scientific Reports*. **6**, 24456. PMC4834509.
5. G.L.Ciampaglia, P.Shiralkar, L.M.Rocha, J. Bollen, F. Menczer, A. Flammini [2015]. "Computational fact checking from knowledge networks." *PloS ONE*. **10**(6):e0128193.

Other relevant and significant publications

1. R.B. Correia, L.P. de Araújo, M.M. Mattos, L.M. Rocha [2019]. City-wide Analysis of Electronic Health Records Reveals Gender and Age Biases in the Administration of Known Drug-Drug Interactions. *NPJ Digital Medicine*. **2**:74

2. I. B. Wood, P.L. Varela, J. Bollen, L.M. Rocha, and M.J. Sá [2017] "Human Sexual Behavior is driven by culture and collective moods." *Scientific reports* **7** (1): 17973. PMC5740080.
3. M. Marques-Pita and L.M.Rocha [2013]. "Canalization and control in automata networks: body segmentation in *Drosophila melanogaster*." *PLOS One*, **8**(3): e55946. PMC3592869.
4. T. Simas and L.M. Rocha [2015]. "Distance Closures on Complex Networks." *Network Science* **3**(2):227-268.
5. A. Kolchinsky, M.P. van den Heuvel, A. Griffa, P. Hagmann, L.M. Rocha, O. Sporns and J. Goñi [2014]. "Multi-scale Integration and Predictability in Resting State Brain Activity". *Frontiers in Neuroinformatics*. **8**:66.

D. Synergistic activities

1. Translational research: For decades, I have been developing complex networks and systems methods and partnering with various subject area experts to apply them to modeling biomedical problems. I formed the *Complex Systems Modeling Team* at the Los Alamos National Laboratory in 1999 and currently direct the new *Center for Biomedical and Social Complexity* at Indiana University. Over the years I have worked with life scientists in institutions such as the Santa Fe Institute and the Instituto Gulbenkian de Ciencia to solve problems of biomedical importance using AI, data science, and complexity science.
2. Innovations in training: As Director and PI of the *NSF-NRT: Interdisciplinary Training in Complex Networks and Systems* at Indiana University, I have led the unique design and implementation of a large student program wherein trainees enroll in a dual-major PhD program in Complex Networks and Systems and an empirical domain (e.g. biology, ecology, neuroscience, economics, cognitive science, sociology).
3. Innovations in teaching: I have developed and presented multiple classes and short courses in novel areas of study and been the recipient of the IU Trustees' Award for Teaching Excellence in 2006 and 2015. Examples relevant to the EEID proposal and within the Luddy School include: "Biologically-inspired computing" (Undergraduate 2005-15, Graduate, 2005-12), "Advanced Complex Systems Seminar" (Graduate, 2012-16), Introduction to Informatics (Graduate, 2008-15).
4. Service to the scientific community - knowledge transfer: I have delivered more than 130 invited and keynote presentations including the following EEID relevant examples from the past three years: Artificial Intelligence, HPC and Biomedicine: implicit biases, scientific, technical and ethical challenges, Barcelona Supercomputing Center, 2020; Complex Systems @ Purdue, Purdue University, West Lafayette, Indiana, 2019; Network Medicine (NetMed18): Personalized Medicine in the Era of Big Data; Week of Complexity Sciences 2018, Universidad Nacional Autonoma de México, Mexico City; Controlling Complex Systems 2017 (at NetSci 2017); Humboldt-Universität zu Berlin, Germany (2017); Institute for Scientific Interchange, Turin, Italy (2016); Mathematical Biosciences Institute, Ohio State University (2016).
5. Service to the scientific community - active advisory roles: Member of the advisory council of the *Complex Systems Society*; member of the advisory council of the *Indiana University Network Science Institute*; co-director *Center for Social and Biomedical Complexity*, Indiana University; program committee member of key field conferences such as *Complex Networks* and *Conference on Complex Systems*; review committee member of major centers such as the *Center for the Study of Complex Systems* (CSCS) at the University of Michigan and the *Biocomputational Evolution in Action CONsortium* (BEACON) NSF Science & Technology Center at Michigan State University.