

Shade T. Shutters, PhD, CMA

Research Scientist

Arizona State University
School of Complex Adaptive Systems
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PROFESSIONAL APPOINTMENTS

Academic Appointments

2019 – External Research Faculty, The Global Climate Forum, Berlin, Germany
2014 – Research Scientist, School of Complex Adaptive Systems, Arizona State University
2019 – 2022 Fellow, Knowledge Exchange for Resilience, Arizona State University
2012 – 2014 Postdoctoral Research Scholar, Center for Social Dynamics & Complexity, Arizona State University
2010 – 2012 Adjunct Professor, School of Sustainability, Arizona State University
2009 – 2010 Postdoctoral Research Scientist, Faculty of Applied Economics, University of Vigo (Spain)
2006 – 2009 IGERT Fellow in Urban Ecology, School of Life Sciences, Arizona State University
2003 – 2006 NSF Predoctoral Fellow, School of Life Sciences, Arizona State University

Administrative Appointments

2023 – Director of Economic Transformations, Decision Theater, Arizona State University
2020 – Founding Director, Laboratory for Regional Dynamics and Development
2019 – Founding co-Director, Complexity Economics Lab
2018 – 2021 Science Officer, National Laboratory for Education Transformation, Carmel, California, USA

Other Research Affiliations

2013 – Faculty Affiliate, Center on Technology, Data and Society, Arizona State University
2011 – Senior Global Futures Scientist, Global Futures Laboratory, Arizona State University
2010 – Core Faculty, Center for Social Dynamics & Complexity, Arizona State University
2017 – 2022 Faculty Affiliate, Center for Smart Cities and Regions, Arizona State University
2015 – 2019 Faculty Affiliate, Center on the Future of War, Arizona State University
2003 – 2009 Graduate Student Affiliate, Center for Environmental Studies, Arizona State University

EDUCATION

2009 Doctor of Philosophy, Biology (Systems Ecology)
Arizona State University, Tempe, Arizona, USA

1990 Bachelor of Science (with Honors), Business Administration (Finance, Accounting)
Indiana University, Bloomington, Indiana, USA

EDITORIAL APPOINTMENTS

2023 – *PLOS Complex Systems*, Editorial Board and Associate Editor
2016 – *Urban Science*, Editorial Board and Associate Editor
2015 – *Humanities & Social Sciences Communications*, Editorial Board and Associate Editor

INDUSTRY POSITIONS (ABRIDGED)

Shutters Consulting LLC, Tempe, Arizona, USA

2001 – Owner and principal consultant

- Delivering data-driven decision support tools and management consulting services

Rockford Europe GmbH, Achim, Germany

1999 – 2001 CEO (Geschäftsführer)

- Managed all aspects of a 25-person, \$20 million European distribution and marketing headquarters

Rockford Corporation, Tempe, Arizona, USA

1998 – 1999 Director of International Finance
1995 – 1998 Manager of Financial Planning and Analysis
1993 – 1995 Operations Analyst / New Product Development

- Developed sophisticated global forecasting and financial analytic algorithms, managing global finances and offices in 5 countries

AWARDS, HONORS, AND SCHOLARSHIPS

2023	Visiting Scholar, Jönköping University (Sweden)	
2022	Fellow, Institute for Advanced Sustainability Studies (Potsdam, Germany)	
2020	Visiting Faculty Award, University of Lausanne (Switzerland)	\$5,000
2014	Visiting Scholar, Santa Fe Institute	
2011	Young Scholar Elect, Resilience Alliance, Stockholm Resilience Center	
2008	Graduate Travel Grant, School of Life Sciences, Arizona State University	\$750
	• Student Author Travel Award, Air Force Office of Scientific Research	\$110
	• AAAS Annual Conference, Student Research Projects in Social Sciences, 2 nd place	
2007	Conference Attendance Grant, Global Institute of Sustainability, Arizona State University	\$1,800
2006	International Travel Grant, Arizona State University	\$1,500
	• International Conference Attendance Grant, University of Bologna (Italy)	\$350
2005	Graduate Travel Grant, School of Life Sciences, Arizona State University	\$500
	• Summer Institute Fellowship, Indiana University	\$1,200
2004	Graduate Research Fellowship, US National Science Foundation	\$120,000
	• Conference Attendance Grant, University of Washington	\$2,500
2003	NSF IGERT Fellowship in Urban Ecology, Arizona State University	\$120,000
2002	Outstanding chemistry student 2001-2002, Scottsdale Community College	
1995	Beyer Silver Medal, 2 nd highest score in USA, 1995 Uniform CMA Exam	

REFEREED PUBLICATIONS

First author – 27 Sole author – 9 Unique co-authors – 81

50. Uncovering economic vulnerabilities induced by interdependent networks
S Pourshahabi, **ST Shuttters**, R Muneeppeerakul (2024) *In review*
49. Cornering the Market with Foreign Direct Investments: China's Cobalt Politics
SO Altıparmak, K Waters, CG Thies, **ST Shuttters** (2024) *In review*
48. The geoeconomics of renewable energy: China's involvement in the European Union market
SO Altıparmak, CG Thies, K Waters, **ST Shuttters** (2024) *In review*
47. Global Coal Trade Distributions from 1988 to 2021
K Waters, **ST Shuttters** (2024) *In review*
46. Pattern Detection in Bipartite Networks: A Review of Terminology, Applications and Methods
Z Neal, A Berger, B Butterfield, D Garlaschelli, N Gotelli, F Saracco, T Squartini, **ST Shuttters**, W Ulrich, G Wang, G Strona (2024) *In revision*. Preprint available at: doi:10.48550/arXiv.2310.01284
45. Employment and land use in the United States: cross-sectional and short-term trends reveal the importance of the 96th Meridian
D Rybski, DP Helmers, P Pradhan, **ST Shuttters**, V Radeloff, V Butsic (2024) *In review*. Preprint available at doi:10.48550/arXiv.2212.01148
44. Transitioning to a Green Economy: Radical Transformation or Building Upon Existing Skills?
ST Shuttters, J Lobo (2024) *In review*. Preprint available at doi:10.2139/ssrn.4097137
43. Fueling a Net-Zero Future: The Influence of Publicly Funded Research on Clean Energy Inventions
J Wang, J Lobo, **ST Shuttters**, D Strumsky (2024) *Environmental Innovations and Societal Transitions*: 51(2024):100836, doi:10.1016/j.eist.2024.100836
42. Urban economic structures as multidimensional networks: A complex systems framework for analyzing economic development trajectories
ST Shuttters (2024) *Complexity* 2024:5521625, doi:10.1155/2024/5521625
41. The Green Mirage: The EU's Complex Relationship with Palm Oil Biodiesel in the Context of Environmental Narratives and Global Trade Dynamics
K Waters, SO Altıparmak, **ST Shuttters**, CG Thies (2024) *Energies* 17(2):343, doi:10.3390/en17020343

40. A U.S. clean energy transition can enhance national security but it's not the bulletproof strategy you might think
ST Shuttters, SO Altiparmak (2023) *Modern Diplomacy*, 07-Dec-2023
39. Inducing New Bilateral Oil Interdependencies: The unintended impact of 2014 US-led sanctions on Russia
SO Altiparmak, CG Thies, ST Shuttters, K Waters (2023) *Journal of Indo-Pacific Affairs* 6(3):154-165
38. Industrial structure and a tradeoff between productivity and resilience
ST Shuttters, K Waters (2022) *Studies in Business and Economics* 17(3):224-240, doi:10.2478/sbe-2022-0057
37. Evaluating multi-level resilience of Russian urban economies 2010-2019
M Rogov, C Rozenblat, M Bida, ST Shuttters (2022) *Ecology and Society* 27(4):37, doi:10.5751/ES-13691-270437
36. Regional Economic Tightness from Rural to Urban Regions
K Waters, ST Shuttters (2022) *Urban Transformations* 4:15, doi:10.1186/s42854-022-00044-6
35. Skills-Approximate Occupations: Using Networks to Guide Jobs Retraining
K Waters, ST Shuttters (2022) *Applied Network Science* 7(1):1-13, doi:10.1007/s41109-022-00487-7
34. Triad analysis of global energy trade networks and implications for energy trade stability
ST Shuttters, K Waters, R Muneepeerakul (2022) *Energies* 15(10):3673, doi:10.3390/en15103673
33. The Urban Wage Premium is Disappearing in U.S. Micropolitan Areas
ST Shuttters, JM Applegate (2022) *Plos One* 17(4):e0267210, doi:10.1371/journal.pone.0267210
32. Impacts of Skills Centrality on Regional Economic Productivity and Occupational Income
K Waters, ST Shuttters (2022) *Complexity* 2022:5820050, doi:10.1155/2022/5820050
31. Urbanization favors high wage earners
ST Shuttters, JM Applegate, E Wentz, M Batty (2022) *npj Urban Sustainability* 2:6, doi:10.1038/s42949-022-00049-x
30. Modelling long-term COVID-19 impacts on the U.S. workforce of 2029
ST Shuttters (2021) *Plos One* 16(12):e0260797, doi:10.1371/journal.pone.0260797
29. Industry interconnectedness and regional economic growth in Germany
ST Shuttters, H Seibert, B Alm, K Waters (2021) *Urban Science* 6(1):1, doi:10.3390/urbansci6010001
28. A Convergence Research Perspective on Graduate Education for Sustainable Urban Systems Science
J Lobo, M Alberti, M Allen-Dumas, LMA Bettencourt, A Beukes, LA Bojórquez Tapia, W-Q Chen, A Dodge, Z Neal, A Perreira, D Pfeiffer, A Revi, D Roberts, C Rozenblat, ST Shuttters, ME Smith, E Stokes, D Strumsky, J Wu (2021) *npj Urban Sustainability* 1:39, doi:10.1038/s42949-021-00044-8
27. Characterizing the sectoral development of cities
D Rybski, P Pradhan, ST Shuttters, V Butsic, JP Kropp (2021) *Plos One* 16(7):e0254601, doi:10.1371/journal.pone.0254601
26. Resilience of Urban Economic Structures Following the Great Recession
ST Shuttters, S Kandala, F Wei, AP Kinzig (2021) *Sustainability* 13(4):2374, doi:10.3390/su13042374
25. Innovations and Economic Output Scale with Social Interactions in the Workforce
DT Painter, ST Shuttters, E Wentz (2021) *Urban Science* 5(1):21, doi:10.3390/urbansci5010021
24. Inferring networks of interdependent labor skills to illuminate urban economic structure
ST Shuttters, K Waters (2020) *Entropy* 22(10):1078, doi:10.3390/e22101078
23. A visual analytics framework for spatiotemporal trade network analysis
H Wang, Y Lu, ST Shuttters, M Steptoe, F Wang, S Landis, R Maciejewski (2019) *IEEE Transactions on Visualization and Computer Graphics* 25(1):331-341, doi:10.1109/TVCG.2018.2864844
22. Urban Science: Putting the “Smart” in Smart Cities
ST Shuttters (2018) *Urban Science* 2(4):94, doi:10.3390/urbansci2040094
21. Urban occupational structures as information networks: The effect on network density of increasing number of occupations
ST Shuttters, J Lobo, R Muneepeerakul, D Strumsky, C Mellander, M Brachert, T Farinha-Fernandes, LMA Bettencourt (2018) *Plos One* 13(5):e0196915, doi:10.1371/journal.pone.0196915
20. A Flexible Data-Centric Approach for Modeling and Analyzing Hyper Connected Megacities
S Candan, ST Shuttters, C Fortunato (2017) *Small Wars Journal* 13(7):14-Jul-2017

19. Interdependent Preferences and Prospects for Global Sustainability
ST Shutters (2016) *International Journal of Sustainability Policy and Practice* 12(3):25-39, doi:10.18848/2325-1166/CGP/v12i03/25-39
18. Constrained pathways to a creative urban economy
ST Shutters, R Muneepeerakul, J Lobo (2016) *Urban Studies* 53(16):3439-3454, doi:10.1177/0042098015616892
17. How hard is it for urban economies to become “green”?
ST Shutters, R Muneepeerakul, J Lobo (2016) *Environment and Planning B: Urban Analytics and City Science* 43(1):198-209, doi:10.1177/0265813515600108
16. Anticipating Megacity Responses to Shocks: Using Urban Integration and Connectedness to Assess Resilience
ST Shutters, W Herche, E King (2016) *Small Wars Journal* 12(2):26-Feb-2016
15. The New Global Urban Realm: Complex, Connected, Diffuse, and Diverse Social-Ecological Systems
MR McHale, STA Pickett, O Barbosa, DN Bunn, ML Cadenasso, DL Childers, M Gartin, G Hess, DM Iwaniec, T McPhearson, MN Peterson, AK Poole, L Rivers III, **ST Shutters**, W Zhou (2015) *Sustainability* 7(5):5211-5240, doi:10.3390/su7055211
14. Quantifying urban economic resilience through labour force interdependence
ST Shutters, R Muneepeerakul, J Lobo (2015) *Humanities and Social Sciences Communications* 1(201510):1-7, doi:10.1057/palcomms.2015.10
13. Altruism displays a harmonic signature in structured societies
ST Shutters, D Hales (2015) *Journal of Artificial Societies and Social Simulation* 18(3):2, doi:10.18564/jasss.2780
12. Public Representation in Water Management – A Network Analysis of Organization and Public Perceptions in Phoenix, Arizona
BB Cutts, T Muñoz-Erickson, **ST Shutters** (2015) *Society and Natural Resources* 28(12):1340-1357, doi:10.1080/08941920.2015.1020581
11. Living in a network of scaling cities and finite resources
M Qubbaj, **ST Shutters**, R Muneepeerakul (2014) *Bulletin of Mathematical Biology* 77(2):390-407, doi:10.1007/s11538-014-9949-3
10. Urban Economies and Occupation Space: Can They Get “There” from “Here”?
R Muneepeerakul, J Lobo, **ST Shutters**, A Gómez-Liévano, M Qubbaj (2013) *Plos One* 8(9):e73676, doi:10.1371/journal.pone.0073676
9. Collective action and the detrimental side of punishment
ST Shutters (2013) *Evolutionary Psychology* 11(2):327-346, doi:10.1177/147470491301100204
8. Cultural polarization and the role of extremist agents: a simple simulation model
ST Shutters (2013) *Lecture Notes in Computer Science* 7812:93-101, doi:10.1007/978-3-642-37210-0_11
7. Towards a rigorous framework for studying continuous 2-player games
ST Shutters (2013) *Journal of Theoretical Biology* 321:40-43, doi:10.1016/j.jtbi.2012.12.026
6. Tag-mediated altruism is contingent on how cheaters are defined
ST Shutters, D Hales (2013) *Journal of Artificial Societies and Social Simulation* 16(1):4, doi:10.18564/jasss.2090
5. Cooperation through the endogenous evolution of social structure
D Hales, **ST Shutters** (2013) *Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering* 126:111-126, doi:10.1007/978-3-319-03473-7_10
4. Agricultural trade networks and patterns of economic development
ST Shutters, R Muneepeerakul (2012) *Plos One* 7(7):e39756, doi:10.1371/journal.pone.0039756
3. Punishment leads to cooperative behavior in structured societies
ST Shutters (2012) *Evolutionary Computation* 20(2):301-319, doi:10.1162/EVCO_a_00062
2. Strong reciprocity, social structure, and the evolution of fair allocations in a simulated ultimatum game
ST Shutters (2009) *Computational and Mathematical Organization Theory* 15(2):64-77, doi:10.1007/s10588-008-9053-z
1. Weekly cycling of environmental variables in Phoenix, Arizona
ST Shutters, RC Balling, Jr. (2006) *Atmospheric Environment* 40(2):304-310, doi:10.1016/J.ATMOENV.2005.09.037

OTHER PUBLICATIONS

30. Understanding and Preparing for the Labor Impacts of Decarbonizing the U.S. Economy: A Proposed Research Agenda
ST Shutters, J Lobo (2024) The National Academies of Sciences, Engineering and Medicine, Division of Behavioral and Social Sciences and Education, Board of Environmental Change and Society.
<https://www.nationalacademies.org/event/docs/DC5BCD0836FD2D9442EA7AA333C6E775E7EDFC4B30DC>
29. The Role of Occupational Socialness on the Productivity of Metropolitan Economies
ST Shutters, J Lobo, J Wang (2023) *SSRN Electronic Journal*, doi:10.2139/ssrn.4659919
28. Coal Trade Networks and Trading Communities: The case of Australia
 K Waters, **ST Shutters**, T Clower (2022) *Western Regional Science Association, 2022 Conference*. Scottsdale, Arizona. Feb. 27, 2022
27. Augmenting regional clusters with intellectual property and labor force skills specializations
 T Slaper, R Zipper, **ST Shutters** (2021) *European Regional Science Association, 2021 Conference*. Bolzano, Italy. Aug. 25, 2021. <https://az659834.vo.msecnd.net/eventsairwesteuprod/production-ersa-public/9446f38e9f904e6ca9ed358dcf2a9e29>
26. Impacts of Skills Centrality on Regional Economic Productivity: A Complex Systems Approach
 K Waters, **ST Shutters** (2021) *Mid-Continent Regional Science Association, 2021 Conference*. Online. Jun. 11, 2021
25. A tale of two states: The Impact of #RedForEd on Arizona and Oklahoma
ST Shutters (2021) *LinkedIn Pulse*. <https://www.linkedin.com/pulse/tale-two-states-impact-redfored-arizona-oklahoma-shade-t-shutters>
24. Coronavirus and the Public Good
 AP Kinzig, **ST Shutters** (2021) In *Resilience Matters: Reimagining the Future in a Tumultuous Year* 147-148. L Mazur, ed. Island Press. Washington, DC
23. A Knowledge Exchange Playbook to Build Resilience
 M Hinrichs, P Solis, JM Applegate, S BurnSilver, E Goldman, EW Johnston, TR Miller, D Morrison, M Nation, CN Ngo, **ST Shutters**, E Wentz, M Wyman (2021) <https://hdl.handle.net/2286/R.2.N.160839>. M Hinrichs, P Solis, eds. Global Council for Science and the Environment. Washington, DC
22. Who Gets Their Lights Back First if a Cyberattack Brings Down the Grid?
 J Miller, SM Ravich, **ST Shutters**, B Ruddell, A Fixler (2021) *Slate Magazine*. 19-Jan-2021.
<https://slate.com/technology/2021/01/us-government-continuity-economy-plan-cyberattack.html>
21. Urban Science: Integrated Theory from the First Cities to Sustainable Metropolises
 J Lobo, M Alberti, M Allen-Dumas, E Arcaute, M Barthelemy, LA Bojorquez Tapia, S Brail, LMA Bettencourt, A Beukes, W-Q Chen, R Florida, M Gonzalez, N Grimm, M Hamilton, C Kempes, CE Kontokosta, C Mellander, ZP Neal, S Ortman, D Pfeiffer, M Price, A Revi, C Rozenblat, D Rybski, M Siemiatycki, **ST Shutters**, ME Smith, EC Stokes, D Strumsky, G West, D White, J Wu, VC Yang, A York, H Youn (2020) *SSRN Electronic Journal*, doi:10.2139/ssrn.3526940
20. Coronavirus and the Public Good
 AP Kinzig, **ST Shutters** (2020) *The Progressive*. 18-Mar-2020. <https://progressive.org/op-eds/coronavirus-public-good-kinzig-shutters-200318/>
19. Graduate Education for a New Sustainable Urban Systems Science: Designing a New PhD Curriculum Integrating Sustainability Science and Urban Science
 J Lobo, Z Neal, M Alberti, M Allen-Dumas, LMA Bettencourt, A Beukes, D Pfeiffer, **ST Shutters**, ME Smith, E Stokes, D Strumsky, J Wu (2019) *SSRN Electronic Journal*, doi:10.2139/ssrn.3466322
18. Multi-level approach to urban resilience: conceptual and operational model
 M Rogov, C Rozenblat, **ST Shutters** (2019) *American Association of Geographers, 2019 Conference*, Session on Cities and Networks. Washington, DC. Apr. 6, 2019
17. Interdependence and Its Discontents
ST Shutters, L Mazur (2018) In *Resilience Matters: Transformative Thinking in a Year of Crisis* 12-16. L Mazur, ed. Island Press. Washington, DC
16. What's so smart about "smart" cities?
ST Shutters (2018) *LinkedIn Pulse*. <https://www.linkedin.com/pulse/whats-so-smart-cities-shade-t-shutters/>
15. Workforce Automation and the Mix of College Degrees
ST Shutters (2018) *LinkedIn Pulse*. <https://www.linkedin.com/pulse/workforce-automation-mix-college-degrees-shade-t-shutters/>

14. Human society is totally interdependent—that's a huge advantage, but also a huge survival risk
ST Shuttters, L Mazur (2017) *Quartz Ideas*, 02-May-2017. <https://tinyurl.com/knw78ne>
13. Report on Sociocultural Modeling for Dense Urban Areas
ST Shuttters, DD White, R Halden, A Venkatesan (2016) Arizona State University Technical Report to U.S. Army Training and Doctrine Command
12. Pathways to Ontario's Knowledge Economy: A system for identifying existing regional strengths and future prospects
R Florida, ST Shuttters, G Spencer (2016) Martin Prosperity Research Working Paper Series, 2016-MPIWP-001. Martin Prosperity Institute, Rotman School of Management, University of Toronto. <https://tinyurl.com/wvnt422d>
11. United we fall, divided we stand: Resilience and the role of interdependence
ST Shuttters (2016) *International Urban Resilience Research Network, Viewpoints*. <https://t.co/49BhQzfygK>
10. Cities which plan to transform into a creative engine of innovation may face a long and difficult journey
ST Shuttters (2015) *London School of Economics, US Centre, Daily Blog on US Politics and Policy*. <http://bit.ly/1UgMQ7>
9. Emergence: Religion as a Superorganism
ST Shuttters (2013) *Conference on Emergent Approaches to Human Sociality and Religion*. Tempe, Arizona. Oct. 6, 2013, <https://ssrn.com/abstract=4332962>
8. Conflict, Collapse, Networks, and Governance: 20,000,000 Humans in a Virtual Petri Dish
ST Shuttters (2012)
7. From cells to states: A unifying framework of social relativity
ST Shuttters, M Halás (2011) *European Consortium for Political Research, 2011 General Conference*, University of Iceland, Reykjavik, Iceland. Aug. 27, 2011. doi:10.13140/2.1.1990.9126
6. From terrorism to environmental management: A novel assessment of network robustness using triad analysis
ST Shuttters (2010) doi:10.13140/2.1.4647.0088
5. Strong Reciprocity, Social Structure, and the Evolution of Cooperative Behavior
ST Shuttters (2009) *Doctoral Dissertation, School of Life Sciences, Arizona State University*. doi:10.13140/2.1.5185.7920
4. Punishment, rational expectations, and relative payoffs in a networked prisoners dilemma
ST Shuttters (2009) *Social Computing and Behavioral Modeling* 201-208. H Liu, JJ Salerno, M J Young, eds. Springer. New York, New York. doi:10.1007/978-1-4419-0056-2_25
3. A simulation model of cultural consensus and persistent conflict
ST Shuttters, BB Cutts (2008) In *Proceedings of the Second International Conference on Computational Cultural Dynamics* 71-78. VS Subrahmanian, A Kruglanski, eds. AAAI Press. Menlo Park, California. <https://www.aaai.org/Papers/ICCCD/2008/ICCCD08-011.pdf>
2. Maximizing order entry efficiency using standard value rule sets
ST Shuttters, A Gitch (1998) In *Oracle Applications User Group Fall 1998 USA Conference Proceedings*. OAUG. San Diego, California
1. Facing the challenges of changing fiscal year
ST Shuttters, D Richards (1997) In *Oracle Applications Users Group Fall 1997 USA Conference Proceedings*. OAUG. Orlando, Florida

SOFTWARE, DATASETS, SPECIMEN COLLECTIONS, etc.

9. Replication Data for: Fueling a Net-Zero Future: The Influence of Government-Funded Research on Climate Change Mitigation Inventions
J Wang, J Lobo, ST Shuttters, D Strumsky (2024) *Harvard Dataverse*, V1, doi:10.7910/DVN/NMCLAR
8. Replication Data for: Urban economic structures as multidimensional networks: A complex systems framework for analyzing economic development trajectories
ST Shuttters (2024) *Harvard Dataverse*, V1, doi:10.7910/DVN/AY2HJM
7. Invention Disclosure: A method for forecasting an industry's potential for job growth in a given region
ST Shuttters (2023) Skysong Innovations (SI) Tech ID: M24-116P
6. Natural history specimens collected and/or identified and deposited [Data set]
ST Shuttters (2023) *Zenodo*, doi:10.5281/zenodo.10247189

5. Replication Data for: Modelling long-term COVID-19 impacts on the U.S. workforce of 2029
ST Shuttters (2021) *Harvard Dataverse*, V1, doi:10.7910/DVN/DVHBZT
4. Author Classifications of O*NET Individual Work Activities (IWA) used in “Innovations and Economic Output Scale with Social Interactions in the Workforce”
DT Painter, ST Shuttters, E Wentz (2021). *Zenodo*, version 1, doi:10.5281/zenodo.4434706
3. Replication Data for: Urban Occupational Structures as Information Networks
ST Shuttters, J Lobo, R Muneeppeerakul, D Strumsky, C Mellander, M Brachert, T Farinha-Fernandes, LMA Bettencourt (2018). *Harvard Dataverse*, V1, doi:10.7910/DVN/APJZC8
2. The emergence of tag-mediated altruism in structured societies (Version 1.2.0)
ST Shuttters, D Hales (2015) *CoMSES Computational Model Library*. <https://www.comses.net/codebases/4510/releases/1.2.0/>
1. Replication Data for: Quantifying urban economic resilience through labour force interdependence
ST Shuttters, R Muneeppeerakul, J Lobo (2015) *Harvard Dataverse*, V1, doi:10.7910/DVN/HEWGDD

PUBLICITY AND PRESS COVERAGE

11. New study shows teacher pay in Arizona is 'abysmal'
The Arizona Republic (2018) <https://www.azcentral.com/story/opinion/op-ed/laurieroberts/2018/03/07/new-study-shows-teacher-pay-arizona-abysmal/403695002/>
10. Will our cities survive the 21st century?
Slate Magazine (2018) <https://slate.com/technology/2018/01/will-our-cities-survive-the-21st-century-a-future-tense-event-recap.html>
9. The U.S. metros most at risk from automation
The Atlantic: CityLab (2017) <https://www.citylab.com/life/2017/10/metros-most-at-risk-from-automation/542454/>
8. Big Data, Big Decisions
KED Research (2017) <https://research.asu.edu/stories/20170928-big-data-big-decisions>
7. How data helps cities withstand shock
Christian Science Monitor. (2017) <http://www.csmonitor.com/Science/Complexity/2017/0110/Resilient-Cities>
6. NSF Funds Regional Approach to Big Data Challenges in the West
UC San Diego News (2016) http://ucsdnews.ucsd.edu/pressrelease/big_data_hub_gets_a_spoke_nsf_funds_regional_approach_to_big_data_challenge
5. The future of the knowledge economy is local
The Toronto (Canada) Star (2016) <https://www.thestar.com/opinion/commentary/2016/09/13/the-future-of-the-knowledge-economy-is-local.html>
4. Western US: How the West was one
Site Selection Magazine.(2015) <http://siteselection.com/issues/2015/nov/western-us.cfm>
3. Tired of playing the field? Data may help your city or company find the best match
Site Selection Magazine (2015) <http://siteselection.com/onlineInsider/high-wage-tinder.cfm>
2. The man with the power to predict economic success
ASU News (2015) <https://asunews.asu.edu/20150811-shade-shuttters-predicting-economic-success>
1. One Reason It's So Hard to Become a 'Creative Superstar City'
The Atlantic: CityLab (2015) <http://www.citylab.com/work/2015/05/one-reason-its-so-hard-to-become-a-creative-superstar-city/394256/>

GRANTS AND FUNDING (* PI)

Sum of proposals (awarded and pending only): PI - \$5.9M | coPI - \$7.1M | co-Author - \$6.7M

19. Quantifying structural change in social systems: Resilience across system scales, system dimensions, and physical space
ST Shuttters* (2024) \$1,485,000. US Department of Defense. Duration 36 months. Funding pending.
18. Decision Support Tools for Cities Transitioning to Clean Energy
ST Shuttters*, M Simeone (2022) \$133,000. Zimin Institute for Smart & Sustainable Cities. Duration 24 months.

17. Growing Chinese Economic Power and the Exacerbating Effects of US Economic Interdependence
ST Shuttters*, R Muneeppeerakul, C Thies (2021) \$1,266,800. US Department of Defense, Minerva Research Initiative. Duration 48 months.
16. RAPID: Tacit Knowledge Transfer and COVID-19 Impacts on US Invention
ST Shuttters*, D Strumsky (2020) \$123,000. US National Science Foundation. Duration 24 months. (Assigned as PI after departure of original PI).
15. A complexity approach to resilience of urban economies
ST Shuttters* (2019) \$47,500. Virginia G. Piper Charitable Trust. Duration 18 months.
14. Building Critical Mass at the Complexity Science Hub Vienna—Establishing and Expanding Complexity Science in Austria
 Several coPIs, **ST Shuttters** (2019) €4,600,000 (\$5,200,000). FTF Austrian Science Fund. Duration 72 months.
13. Expanding the Boundaries of Regional Economic Development: Integrating Complex Adaptive Systems
ST Shuttters* (2019) \$29,500. US Dept. of Commerce, Economic Development Administration. (Subaward through Indiana University). Duration 18 months.
12. Achieve60AZ decision modeling platform
 J Miller*, E Johnston, **ST Shuttters** (2017) \$550,000. Arizona Board of Regents. Duration 12 months.
11. Center for Educational Excellence powered by Helios
 J Miller*, E. Johnston, **ST Shuttters** (2017) \$2,350,000. Helios Foundation. Duration 36 months.
10. Economic System Security in the 21st Century
ST Shuttters*, S Burke, C Thies (2017) \$1,700,000. US Department of Defense, Minerva Research Initiative. Duration 36 months. Selected for funding but canceled due to failure of U.S. congress to approve a federal budget.
9. ASU Decision Theater – US Army TRADOC Partnership/Megacities
 J Miller*, **ST Shuttters**, R Salla, K Candan, D Boscovic (2017) \$624,999. US Department of Defense, US Army Training and Doctrine Command. Duration 12 months.
8. Metroinsight: Knowledge discovery and real-time interventions from sensory data flows in urban spaces
ST Shuttters* (2016) \$179,100. US National Science Foundation. Duration 24 months.
7. Mesoscale Data Fusion to Map and Model the US FEW system (INFEWSion)
 B Ruddell*, **ST Shuttters**, J Sabo, K Gurney, WM Hanemann (2016) \$3,000,000. US National Science Foundation. Duration 48 months.
6. Exacerbation and export of localized climate change impacts through agricultural trade networks
ST Shuttters*, R Maciejewski (2016) \$93,200. Skoll Global Threats Fund (unsolicited). Duration 12 months.
5. US Army and Megacities: Planning for 2040
 R Halden*, DD White, **ST Shuttters**, M Dalrymple, P Shakarian (2015) \$491,000. US Department of Defense (unsolicited). Duration 12 months.
4. Decision support for regional transboundary issues: Towards a new science of intercity relations
ST Shuttters*, R Muneeppeerakul (2013) \$500,000. Walton Sustainable Solutions Initiative. Duration 36 months.
3. Phase transitions and allometry in social systems
ST Shuttters*, M Barton, M Laubichler (2012) \$43,467. Arizona State University, College of Liberal Arts & Sciences Seed Funding. Duration 12 months.
2. Socio-economic Factors in Designing Control Strategies for Forest Pathogens
 J Touza*, **ST Shuttters** (2010) Convocatoria de ayudas de Proyectos de Investigación Fundamental no orientada. €900,000. Duration 36 months.
1. Assessing robustness and evolutionary trajectories of complex social-ecological networks through triad motif analysis
ST Shuttters* (2009). National Institute for Mathematical and Biological Synthesis. \$130,000. Duration 24 months. (Subsequently declined to pursue postdoc at the University of Vigo).

INVITED TALKS

41. Understanding and Preparing for the Labor Impacts of Decarbonizing the U.S. Economy: A Proposed Research Agenda
 Developing and Assessing Ideas for Social and Behavioral Research to Speed Efficient and Equitable Industrial Decarbonization: A Workshop. U.S. National Academies of Science. Washington, DC. Feb. 26, 2024.

40. Using complex networks to operationalize the vague notion of urban economic structure
Workshop on Data Analytics and Computational Modeling for Social Challenges. Phoenix, Arizona. Jan. 24, 2024.
39. Linking networks to uncover cryptic risks and vulnerabilities
2023 U.S. Air Force Trust & Influence Program Review. US Air Force Academy, Colorado Springs, Colorado. Aug. 15, 2023.
38. How Complexity Science Can Guide Urban Transformations
Consortium for Science, Policy & Outcomes (with B Alm). Washington, DC. March 23, 2023.
37. Using Networks to Assess Resilience and Vulnerabilities of Global Trade
2022 U.S. Air Force Trust & Influence Program Review. Arlington, Virginia. Sep. 13, 2022.
36. A complexity approach to understanding structural change of regional economies
United Nations University. Maastricht, Netherlands. Apr. 21, 2022.
35. Decarbonize with Big Data: Why should I give you my data, and what do I get?
The Sustainability and Security Forum. (Panelist). Washington, DC. Oct. 21, 2021.
34. Security implications of U.S. Economic Interdependence
2021 U.S. Air Force Trust & Influence Program Review. Washington, DC. Aug. 16, 2021.
33. From Panarchy to practice: A complexity approach to understanding urban resilience
Complexity Science Hub-Vienna. Vienna, Austria. Feb. 19, 2021.
32. Urban Resilience Tools for Economic Development Planning
U.S. Economic Development Administration, National Research & Technical Assistance Network. (with K Waters) Washington, DC. Oct. 29, 2020.
31. Biological Rationality and Policy Making
Winter School on Cooperation and Conflict. Tempe, Arizona. Jan. 9, 2020.
30. Urban Science Curriculum: Perspectives from the Security Community
NSF Workshop: Graduate Education for a New Sustainable Urban Systems Science. Tempe, Arizona. Sep. 20, 2019.
29. Complexity methods for comparing urban economies
Potsdam Institute for Climate Impacts Research. Potsdam, Germany. June 7, 2019.
28. Computational Approaches to Comparative Urban Analysis
Oak Ridge National Laboratory. Oak Ridge, Tennessee. Apr. 29, 2019.
27. Resilience and job growth strategies
Workshop: A New Framework for Regional Economic Development. U.S. Economic Development Agency. Arlington, Virginia. Apr. 3, 2019.
26. Data-driven decision tools for economic development
NSF Program 2018 Meeting: BIGDATA and Big Data Hubs & Spokes. (with U Soni) Alexandria, Virginia. June 21, 2018.
25. The Future of Work: Intelligent Machines, Automation, & Societal Impacts
NSF South Big Data Hub, Data Science Roundtable (Panelist). Washington, DC. Apr. 12, 2018.
24. A Dynamic Economy Is a Spectrum of Jobs
International Economic Development Council. Las Vegas, Nevada. Jan. 29, 2018.
23. Will our cities survive the 21st century?
COMEXI Future Tense Event (Panelist). Mexico City, Mexico. Jan. 23, 2018.
22. Labor Analytics for Targeted Job Growth
Data2work Program. University of Chicago, Chicago, Illinois. Dec. 6, 2017.
21. Understanding the Labor Composition of Cities
Workshop on Innovation, Cities, and the Future of Work. MIT, Cambridge, Massachusetts. Nov. 15, 2017.
20. How to Transition to a Green Economy Within a City
Sustainable Cities Network (with K Feige, D Korz) Tempe, Arizona. Sep. 18, 2017.
19. Metrolnsight: Real-time Tools for Urban Decision-making
NSF West Big Data Innovation Hub Conference. Boulder, Colorado. Jun. 5, 2017

18. Industry growth decision tools for Greater Phoenix
WESTMARC Summit on Economic Development. Glendale, Arizona. May 11, 2017
17. Big Data Tools for Workforce Development: Obstacles and Future Directions
University of California-San Diego. Lo Jolla, California. Mar. 21, 2017.
16. MetroInsight: Workforce Analytics for Economic Development
NSF Program 2017 Meeting: BIGDATA and Big Data Hubs & Spokes. (with U Soni) Washington, DC. Mar. 16, 2017.
15. Trade networks and climate change: Local effects – Global impact
Workshop on Human Activity at Scale in Earth System Modeling. Oak Ridge National Laboratory. Oak Ridge, Tennessee. Sep. 19, 2016.
14. State of the Art: Modeling Socio-cultural factors of Dense Urban Areas
Workshop on Human Socio-Cultural Modeling for Dense Urban Areas. Scottsdale, Arizona. Aug. 2, 2016.
13. A network approach to understanding and guiding urban economies
Network Science Institute, Indiana University. Bloomington, Indiana. Feb. 24, 2016.
12. Understanding and facilitating transitions to sustainable cities
KTH Royal Institute of Technology. Stockholm, Sweden. Dec. 14, 2015.
11. Constrained Pathways to a Creative Urban Economy
IMT Institute for Advanced Studies. Lucca, Italy. Oct. 9, 2015.
10. Assessing urban economic resilience: lessons from the USA and possibilities for developing regions
US National Geospatial Intelligence Agency. Springfield, Virginia. Sep. 10, 2015.
9. Novel methods for understanding and facilitating urban transformations
The Martin Prosperity Institute. Rotman School of Management. University of Toronto. Toronto, Canada. Jul. 20, 2015.
8. Labor Sector Interdependencies and Urban Resilience
Center for Urban Resilience. Loyola Marymount University. Los Angeles, California. Nov. 12, 2014.
7. Keynote: Emergence: Religion as a superorganism
Conference on Emergent Approaches to Human Sociality and Religion. Tempe, Arizona. Oct. 6, 2013.
6. Complexity tools for targeted job growth
The Greater Phoenix Economic Council. Phoenix, Arizona. June 17, 2013.
5. Modelling rational agents: Implications for successful environmental governance
University of Vermont, Burlington, Vermont. Feb. 21, 2012.
4. Tackling sustainability in the face of competitive forces
Simpson College, Indianola, Iowa. Mar. 31, 2011.
3. Punishment, rational expectations, and relative payoffs
Aptima, Inc., Woburn, Massachusetts. June 12, 2009.
2. Social structure and the evolution of cooperation
Social Science Agent-based Modelling Group. University of Arizona. Tucson, Arizona. Apr. 17, 2008.
1. The role of altruistic punishment in the evolution of cooperation
Workshop in Political Theory. Indiana University. Bloomington, Indiana. May 21, 2005.

PRESENTATIONS – CONFERENCES, WORKSHOPS, etc.

28. Occupational tasks and the role of worker socialness on rates of urban invention
7th CEnSE Urban and Regional Economics Workshop. Jönköping International Business School. Gothenburg, Sweden. Oct. 26, 2023.
27. A framework for viewing urban economic structures as multidimensional networks
2023 Conference on Complex Systems, satellite UrbanSys2023. Salvador (Bahai), Brazil. Oct. 18, 2023.
26. Using Trade Networks to Identify Risks and Vulnerabilities
2022 Department of Defense Minerva program review. Arlington, Virginia. May 3, 2023.

25. Diversity in International Energy Trade Markets
American Association of Geographers Annual Meeting. (with K Waters, R Muneeppeerakul). Denver, Colorado. Mar. 25, 2023
24. Using multidimensional networks to better understand constraints and possibilities of urban development
Western Regional Science Association 2023 meeting. Waikoloa, Hawaii. Feb. 16, 2023
23. Global Palm-Oil Trade: A Network Analysis Approach
Southeastern Division, American Association of Geographers, 77th Annual Meeting. (with K Waters) Atlanta, Georgia. Nov. 21, 2022
22. Co-agglomeration Networks
American Association of Geographers 2022 Conference. (with K Waters) New York, New York. Feb. 25, 2022
21. Coal Trade Networks and Trading Communities: The case of Australia
Western Regional Science Association, 61st Annual Meeting. (with K Waters, T Clower) Scottsdale, Arizona. Feb. 19, 2022
20. Augmenting regional clusters with intellectual property and labor force skills specializations
European Regional Science Association Annual Meeting. (with T Slaper, R Zipper) Bolzano, Italy. Aug. 25, 2021.
19. Evaluating multilevel urban resilience: The case of Russian urban economies 2010-2019.
Annual Conference of the International Geophysical Union Commission on Urban Geography. (with C Rozenblat, M Rogov). Beirut, Lebanon. Aug. 23, 2021.
18. Impacts of Skills Centrality on Regional Economic Productivity: A Complex Systems Approach
Mid-Continent Regional Science Association, 51st Annual Meeting. (with K Waters) Online. Jun. 11, 2021.
17. Regional Economic Tightness from Rural to Populous Regions
Southern Regional Science Association, 60th Annual Meeting. (with K Waters) Online. Apr. 6, 2021.
16. Skills-Approximate Occupations: Using Networks to Guide Jobs Retraining
Western Regional Science Association, 60th Annual Meeting. (with K Waters) Online. Feb. 22, 2021.
15. The effect of industry interconnectedness on German economic growth and resilience during the 2007-09 global financial crisis
Workshop: Urban Europe: Precarious Futures? (with H Seibert, B Alm) Coventry University, Coventry, England. Dec. 2, 2020.
14. Assessing urban adaptive capacity using economic networks
American Association of Geographers 2020 Conference, session on Urban and Spatial Networks. (with F Wei, D Weber, S Kandala, V Bajaj) Denver, Colorado. Apr. 7, 2020.
13. A complexity approach to labor dynamics and economic development tools
Community Indicators Consortium Fall 2017 Conference. St. Petersburg, Florida. Nov. 16, 2017.
12. Smart targets: Labor structure constraints on regional specialisation
International Conference of the Royal Geographical Society. London, England. Sep. 1, 2016.
11. Pathways to Ontario's Knowledge Economy: A system for identifying existing regional strengths and future prospects
Regional Studies Association 2nd North American Conference. (with R Florida, G Spencer) Atlanta, Georgia. Jun. 15, 2016.
10. Analyzing and guiding megacities: Data challenges and possibilities
Convening on Urban Data Science. University of Chicago, Chicago, Illinois. Apr. 28, 2016.
9. Cultural polarization and the role of extremist agents: a simple simulation model
International Conference on Social Computing, Behavioral-Cultural Modeling, & Prediction. Washington, DC. Apr. 3, 2013.
8. Cooperation through the endogenous evolution of social structure
2nd International Conference on Complex Systems. (with D Hales) Santa Fe, New Mexico. Dec. 6, 2012.
7. From cells to states: A unifying framework of social relativity
European Consortium for Political Research 2011 General Conference (with M Halás) University of Iceland, Reykjavik, Iceland. Aug. 27, 2011.
6. Organizational attributes and the emergence of cooperative behavior in networked populations
Computational Social Science Society of the Americas 2010 Conference. (with JT Murphy) Tempe, Arizona. Nov. 6, 2010.

5. Punishment, rational expectations, and relative payoffs
2nd International Workshop on Social Computing, Behavioral Modeling, and Prediction. Phoenix, Arizona. Mar. 31, 2009.
4. A simulation model of cultural consensus and persistent conflict
2nd International Conference on Computational Cultural Dynamics. (with BB Cutts) University of Maryland. College Park, Maryland. Sep. 16, 2008.
3. International agreements and their effects on globalization
American Association for the Advancement of Science Annual Meeting. (with A Glorioso) Boston, Massachusetts. Feb. 16, 2008.
2. Social structure: The key to cooperative behavior?
Conference for Sustainability IGERTs. University of Alaska. Fairbanks, Alaska. Oct. 12, 2007.
1. Simulating the effects of strong reciprocity on fair allocations
International Workshop on Cooperation in Selfish Systems. University of Bologna. Bertinoro, Italy. May 28, 2006.

PRESENTATIONS – INTRA-CAMPUS

22. Using data science to understand urban systems
The Unit for Data Science. Oct. 19, 2022.
21. Why study social insects - Panel
Social Insect Research Group. Sep. 9, 2022.
20. Interdependence networks: A complexity approach to understanding urban resilience
School of Complex Adaptive Systems Faculty Seminar Series. Feb. 18, 2022.
19. Resilience in Complex Systems: The Case of Urban Economies
School of Sustainability Research Seminar. Oct. 28, 2020.
18. Panelist: Resilience as a Design Principle for Smart Cities and Regions
ASU Smart Cities and Regions Research Workshop. Nov. 12, 2019.
17. Analytics of Complex Adaptive Systems (and the Networks that Structure Them)
Analytics@ASU Cyber Monday Talks, W.P. Carey School of Business. Nov. 30, 2015.
16. Managing the hive: what social insect colonies tell us about organizational function
Launch ceremony of the ASU Biomimicry Center. (with J. Fewell) Mar. 3, 2015.
15. Measuring “connectedness”: A key to quantifying urban resilience
ecoSERVICES Group. Feb. 2, 2015.
14. Evolutionary Psychology meets Behavioral Economics
Consortium for Biosocial Complexity (with D Kenrick) Feb. 27, 2014.
13. Urban Reinvention: Complexity tools for targeted job growth
School of Public Affairs. Nov. 1, 2013.
12. Using complexity tools to go green: a novel approach to urban growth
ecoSERVICES Group. Aug. 30, 2013.
11. Social networks and the evolution of cooperation
Symposium on Interdisciplinary Research in Science & Engineering. Oct. 17, 2008.
10. Social structure allows 3rd party punishment to flourish
Graduates in Earth, Life, and Social Sciences Research Symposium. Feb. 1, 2008.
9. Social structure: A key to strong reciprocity?
Student Organization for Computational Social Science. Oct. 2, 2007.
8. Self-enforcing attributes and success of international environmental treaties
Community of Undergraduate Research Scholars Symposium. (with A Glorioso) May 2, 2007.
7. Effects of the costs of strong reciprocity on fair allocations in a simulated ultimatum game
Student Organization for Computational Social Science. May 12, 2006.

6. An agent-based model of altruistic punishment
Urban Ecology Reading Group. 26, 2005.
5. Weekly cycling of environmental variables in Phoenix, Arizona
Graduates in Earth, Life, and Social Sciences Research Symposium. Feb. 11, 2005.
4. The role of automobiles in weekly NO_x gas cycles in Phoenix, Arizona
Current Topics in Life Sciences Seminar. Feb. 4, 2005.
3. Indirect reciprocity in the evolution of cooperation
Math and Cognition Colloquium. Sep. 28, 2004.
2. A carbon budget for an urban man-made lake
Graduates in Earth, Life, and Social Sciences Research Symposium (with E Larson, T Windman, T Boheni, R Davies, J Havig, D Gonzales, K McFadden, M Thomas) Feb. 24, 2004.
1. A carbon budget for an urban man-made lake
Central Arizona-Phoenix Long Term Ecological Research (CAP LTER) symposium. (with E Larson, T Windman, T Boheni, R Davies, J Havig, D Gonzales, K McFadden, M Thomas) Feb. 23, 2004.

MENTORING AND ADVISING

Postdoctoral Scholars

Current	Suleyman Altiparmak	Currently at Michigan State University
2022	Keith Waters	Currently faculty at George Mason University

Doctoral Committees

Current	Shokoufeh Pourshahabi	School of Agricultural and Biological Engineering, University of Florida <i>Networks measures of trade induced vulnerabilities</i>
2022	Jacob Douma	School of Geographical Sciences and Urban Planning <i>Labor dynamics of urban economies</i>
2022	Mehdi Bidi	School of Geography - University of Lausanne, Switzerland <i>A micro-level approach of geographical transitions – The case of the evolution of the US system of cities economy over the last two centuries</i>
2021	Mikhail Rogov	School of Geography - University of Lausanne, Switzerland <i>Urban resilience: toward a multi-level approach to Russian metropolitan areas facing the economic crisis of 2014-2016</i>
2019	Claudia ElDib	School of Historical, Philosophical, and Religious Studies <i>Dense Urban Environments</i>
2018	Joffa Applegate	School of Human Evolution and Social Change <i>Complexity Economics Studies of Firm Dynamics</i>
2017	Shirley-Ann Behraves	School of Sustainability <i>The influence of organizational culture on the relationship between sustainable business practice bundles and corporate performance</i>

Masters Committees

2017	Travis Seville	School of Computing, Informatics & Decision Systems Engineering <i>A visual analytics process for exploring risk and vulnerability in international trade networks</i>
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Undergraduate Honors Thesis Committees (* chair)

2022	Eliana Valenzuela *	School of Life Sciences <i>Sweet Lemonade from Sour Lemons: Improvements to STEM Education Quality Amid the Covid-19 Pandemic</i>
2022	Joseph Olakkengil	College of Education <i>Sweet Lemonade from Sour Lemons: Improvements to STEM Education Quality Amid the Covid-19 Pandemic</i>
2020	Jairo Ramirez-Torres	School of Electrical Engineering <i>Assessing the Economic Risks of Counties in the United States to a Loss of Fossil Fuel Dependence for Energy Production</i>
2018	Jason Li	School of Business <i>Exploratory Analysis of My Google Takeout Search History</i>

2017	Sagarika Kadambi	School of Computing, Informatics & Decision Systems Engineering <i>Visual analytics and the impact of inter-Country trade on violence</i>
2014	Jacob McAuliffe	School of Life Sciences <i>The genesis mechanism: An explorative undertaking across academic disciplines in the effort to synthesize a more comprehensive understanding of complexity and the role it has served in the genesis of life.</i>

Research Experience for Undergraduates (REU) Supervision

2024 –	phù Nguyễn Thiên	School of Complex Adaptive Systems <i>Can Vietnam be the solution to US Semiconductor supply chains</i>
2023 –	Anushka Singh	School of Complex Adaptive Systems <i>Impact of trade interdependence on global stock markets</i>
2021 – 2023	Miles McAnulty	School of Politics and Global Studies <i>Energy Alignments for Space-Based Solar Power</i>
2021 – 2022	Erwann Guettouche	School of Mathematical and Statistical Sciences <i>Forecast of Clean Energy Consumption in China Using an Optimized Grey Dynamic Model</i>
2021 – 2022	Gabriel White	School of Computing, Informatics & Decision Systems Engineering <i>A Brief Overview of World Trade 2008-2020</i>
2021 – 2022	Kayleigh Steele	School of Politics and Global Studies <i>The effect a global energy transition on the workforce in the traditional energy industry</i>
2017 – 2018	Nadira Khan	School of Politics and Global Studies <i>Accumulation of coercive economic power by China in Africa</i>
2008 – 2009	Alexandra Glorioso	Department of Economics <i>Self-enforcing attributes and success of international environmental treaties</i>

TEACHING – AT ARIZONA STATE UNIVERSITY UNLESS NOTED

= graduate level, (F) = fall semester, (S) = spring semester, (SS) = summer session

Courses Designed

2021 #	Complexity: Cities as Complex Adaptive Systems
2010	Honors: Social Dilemmas

Courses Taught or Co-taught

2022 (S)	Biology: Individual Research & Readings
2021 (S) #	Sustainability: Fundamentals of Urban Sustainability Science
2019 (S)	Honors: Army TRADOC e-intern program
2018 (F)	Honors: Army TRADOC e-intern program
2018 (F)	Honors: Individual Research
2018 (S)	Honors: Individual Research
2017 (F)	Honors: Individual Research
2014 (F) #	Complexity: Fundamentals of Complex Adaptive Systems Science
2014 (S)	Complexity: Are Sustainable Cities a Contradiction in Terms? (module on Megacities)
1991 (SS)	Accounting: Financial Accounting 2 (Indiana Business College)
1991 (SS)	Accounting: Financial Accounting 1 (Indiana Business College)

Guest Lectures

2024 (S) #	Complexity: Fundamentals of Complex Adaptive Systems Science
2022 (F) #	Complexity: Fundamentals of Complex Adaptive Systems Science
2021 (F) #	Complexity: Fundamentals of Complex Adaptive Systems Science
2020 (S)	Sustainability: Sustainable Urban Dynamics
2019 (F)	Sustainability: Systems Thinking
2017 (F) #	Sustainability: Sustainable Urban Dynamics
2015 (F) #	Sustainability: Sustainable Urban Dynamics
2014 (F) #	Sustainability: Sustainable Urban Dynamics
2013 (F)	Biology: Intro to Applied Mathematics for Life and Social Sciences
2013 (F)	Game Theory and Global Issues (Westwood High School)
2013 (F) #	Complexity: Fundamentals of Complex Adaptive Systems Science
2013 (S)	Game Theory and Global Issues (Westwood High School)
2013 (S)	Biology: Intro to Applied Mathematics for Life and Social Sciences
2013 (S)	History: The Origins of Religion
2012 (S)	Game Theory and Global Issues (Westwood High School)
2009 (F) #	Biology: Humans and Nature: Ecosystem Services

Corporate Training, Designed and Taught

- 1997 – 1999 International banking, accounting, and economics for non-finance personnel (Rockford Corporation)
1997 – 1999 Transnational transfer pricing and tax strategy for non-finance personnel (Rockford Corporation)
1997 – 1999 The basics of financial hedging (Rockford Corporation)

WORKSHOPS AND CONFERENCES – INVITED PARTICIPATION ONLY

37. Shaping Regional Transformations
German Federal Ministry of Economic Affairs and Climate Impacts. Rostock, Germany. Sep. 13-14, 2023.
36. "A Data Analyst, a Sociologist, and a Planner Walk into a...": New Collaborations in Urban Research.
Berlin, Germany. May 12-14, 2022.
35. Graduate Education for a New Sustainable Urban Systems Science: Designing a New PhD Curriculum Integrating Sustainability Science and Urban Science
National Science Foundation. Tempe, Arizona. Sep. 19-20, 2019.
34. Evolution of the Global Economy in the 21st Century
Global Climate Forum. Berlin, Germany. June 3-14, 2019.
33. Regional Economic Development – Future Directions and Goals
U.S Dept. of Commerce, Economic Development Administration. Arlington, Virginia. Apr. 2-3, 2019.
32. Dense Urban Environment Advisory Board Meeting
US Army Asymmetric Warfare Group (AWG). Ft. Hamilton, New York. Jan 31, 2019.
31. Multi-domain Battle in Megacities: Challenges at the Operational and Strategic Levels of War
US Army USARPAC & TRADOC G2, US Army. Ft. Hamilton, New York. Apr. 3-4, 2018.
30. Workshop to Develop a Graduate Curriculum on Dense Urban Areas
ASU Research Enterprise. Tempe, Arizona. Feb. 28 – Mar. 1, 2018.
29. Opportunity data for modeling the future of work
National Laboratory for Educational Transformation. San Diego, California. Feb. 27, 2018.
28. Developing Arizona's Human Capital
Arizona Commission for Postsecondary Education. Scottsdale, Arizona. Dec. 7-8, 2017.
27. Innovation, Cities, and the Future of Work
MIT. Cambridge, Massachusetts. Nov. 14-15, 2017.
26. The Future of Urban Network Research
Ghent University. Ghent, Belgium. Sep. 17-20, 2017.
25. Economics Research Boot Camp
Jönköping University. Jönköping, Sweden. Aug. 23-24, 2017.
24. B2B Data Sharing for Smart Cities and the Internet of Things
Orange Silicon Valley. San Francisco, California. Oct. 24, 2016.
23. Workshop on Human Activity at Scale in Earth System Models: Understanding the links between neighborhood level human activity and global climate change using data analytics, agent-based modeling and earth system modeling
Oak Ridge National Laboratory. Oak Ridge, Tennessee. Sep. 19-20, 2016.
22. Human Socio-Cultural Modeling for Dense Urban Areas
US Army Intelligence Center of Excellence. Scottsdale, Arizona. Aug. 2-3, 2016.
21. Physical Factors of Megacities/Dense Urban Areas
US Army Intelligence Center of Excellence. Scottsdale, Arizona. July 7, 2016.
20. US Army TRADOC Mad Scientist workshop on Megacities
Scottsdale, Arizona. Apr. 21-22, 2016.
19. Megacities Workshop: Geospatial Analytics Applied to Urban Environments
US National Geospatial Intelligence Agency. Springfield, Virginia. Sep. 9-10, 2015.

18. Collective Behavior: From Cells to Societies
US National Academies, Keck Futures Initiative. Huntington Beach, California. Nov. 12-15, 2014.
17. Sustainable Cities Network Annual Conference
Tempe, Arizona. Sep. 23, 2014.
16. Workshop on Urban Innovation and Patent Analytics
Santa Fe Institute. Santa Fe, New Mexico. July 7-8, 2014.
15. Urban Sciences Research Coordination Network annual workshop
Urban Center for Computation and Data. Chicago, Illinois. June 10-11, 2014.
14. Urban Sustainability Research Coordination Network biennial all-hands meeting
Arizona State University. Tempe, Arizona. Mar. 9-11, 2014.
13. Creating the Cities of Tomorrow
Walton Sustainable Solutions Initiatives. Carefree, Arizona. Aug. 11-14, 2013.
12. Conceptual Models of Urban Systems
Urban Sustainability Research Coordination Network working group. North Carolina State University. Raleigh, North Carolina. May 5-7, 2013.
11. Urbanization, Sustainability, Resilience, and Prosperity
Walton Sustainable Solutions Initiatives. Tempe, Arizona. Apr. 17-19, 2013.
10. Complex networks, embedded resource trade, and ecosystems: understanding the sustainability and resilience of urban networks
Arizona State University. Tempe, Arizona. Nov. 1-2, 2012.
9. Managing the Hive: Organization of work in business and eusocial colonies
Arizona State University. Tempe, Arizona. May 4-5, 2011.
8. Global Collective Action and Sustainability
Arizona State University, Tempe, Arizona. Mar. 11, 2011.
7. International Workshop on the Group as Individual in Social Dynamics
Arizona State University, Tempe, Arizona. May 1-2, 2009.
6. 1st International Workshop on Social Computing, Behavioral Modeling, and Prediction
Phoenix, Arizona. Apr. 1-2, 2008.
5. The Group as Individual: Workshop on Multilevel Selection
Arizona State University. Tempe, Arizona. Mar. 19-20, 2008.
4. Empirical techniques for testing agent-based models
Indiana University. Bloomington, Indiana. June 2-4, 2005.
3. Summer Institute on Agent-based Modeling and Natural Resources
Indiana University. Bloomington, Indiana, May 16-June 1, 2005.
2. Complex Adaptive Social Systems
Indiana University. Bloomington, Indiana. Oct. 14-15, 2004.
1. Managing for Resilience: An Integrated Approach to Coastal Marine Science and Conservation
University of Washington. Friday Harbor, Washington. Aug. 23-27, 2004.

SERVICE – PROFESSIONAL

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| 2019 – 2020 | Workshop organizer and program chair, <i>Workshop on non-Euclidian mapping of urban economies</i> . Complexity Science Hub, Vienna, Austria. Mar. 3 – 4, 2020. |
| 2018 | Organizing committee, <i>Workshop to develop a graduate curriculum on Dense Urban Areas</i> . Tempe, Arizona. Feb. 28 – Mar. 1, 2018. |
| 2017 – 2018 | Guest Editor, <i>Urban Science</i> special issue on Urban Modeling and Simulation |

- 2017 Program committee, *2017 International Conference on Social Computing, Behavioral-Cultural Modeling, & Prediction and Behavior Representation in Modeling and Simulation*. Washington, DC. July 5 – 8, 2017.
- 2017 Panelist, *2017 WESTMARC summit on economic development*. Glendale, Arizona. May 11, 2017.
- 2016 Guest Editor, *International Journal of Sustainability in Economic, Social and Cultural Context*
- 2016 Program committee, *2016 International Conference on Social Computing, Behavioral-Cultural Modeling, & Prediction and Behavior Representation in Modeling and Simulation*. Washington, DC. June 28 – July 1, 2016.
- 2015 Program committee, Session on *Urban Metabolism, Morphology and Microclimate Under Global Change*. 2015 Fall Conference of the American Geophysical Union. San Francisco, California. Dec. 14 – 18, 2015
- 2015 Chair, Session on *Complexity and Global Security: Sustainability in a Globalizing, Urbanizing World*, 2015 European Conference on Complex Systems. Tempe, Arizona. Sep. 28 – Oct. 2, 2015.
- 2011 – 2012 Organizing committee, *Workshop on The Origins of Xenophobia*, Origins Project. Tempe, Arizona. Mar. 30 – Apr. 1, 2012.
- 2010 External faculty advisor, Summer Undergraduate Math Enrichment Program, Simpson College, Indianola, Iowa.
- 2010 Review Panelist, Cyberinfrastructure Program, US National Science Foundation.
- 2005 – Invited reviewer for (partial list): *Advances in Complex Systems* • *American J. of Distance Education* • *American J. of Experimental Agriculture* • *Applied Economics* • *Applied Economics Letters* • *Applied Geography* • *Applied Sciences* • *Asia and the Global Economy* • *Asian J. of Agricultural Extension, Economics and Sociology* • *Big Earth Data* • *British J. of Economics* • *Case Studies in Transport Policy* • *City, Culture, and Society* • *City & Community* • *Cogent Arts & Humanities* • *Cogent Engineering* • *Cogent Social Sciences* • *Computational and Mathematical Organization Theory* • *Democracy and Security* • *Ecosystems* • *Electronic Research Archive* • *Entropy* • *Energies* • *Environmental Science and Technology* • *Environmental, Development and Sustainability* • *Frontiers in Sustainable Cities* • *Geographies* • *Geography and Sustainability* • *International J. of Environment and Waste Management* • *International J. of Geo-Information* • *International J. of Intelligent Systems* • *International J. of Management Science and Engineering Management* • *International J. of Sustainability in Economic, Social and Cultural Context* • *International J. of the Commons* • *J. of Artificial Societies and Social Simulation* • *J. of Business & Management* • *J. of Chinese Economic and Business Studies* • *J. of Cleaner Production* • *J. of Complex Networks* • *J. of Economic Behavior and Organization* • *J. of Environmental Design and Planning* • *J. of Environmental Management* • *J. of Geographical Systems* • *J. of Infrastructure, Policy and Development* • *J. of Open Innovation: Technology, Market, and Complexity* • *J. of the Royal Society Interface* • *J. of Theoretical Biology* • *J. of Urban Technology* • *Land* • *Management & Trade* • *Nature* • *Nature Cities* • *Nature Communications* • *Palgrave Communications* • *Planning Practice and Research* • *PLoS One* • *Physics Letters A* • *The Professional Geographer* • *Qeios* • *Remote Sensing* • *Sage Open* • *Scientific Reports* • *Sensors* • *Smart Cities* • *Sustainability* • *Sustainable Cities and Society* • *Systems* • *Tourism Management* • *Transportation Letters* • *Trends in Computer Science and Information Technology* • *Urban Affairs Review* • *Urban Studies*

SERVICE – UNIVERSITY

- 2023 – Curriculum Development Committee, School of Complex Adaptive Systems
- 2022 – Graduate Admissions Committee, School of Complex Adaptive Systems
- 2021 – Founding director, Laboratory for Regional Dynamics and Development
- 2020 – 2022 Decision Theater 3.0 strategic planning team
- 2020 – 2023 co-Founder, co-Director, Complexity Economics Lab
- 2018 – 2019 co-Chair, Metropolitan Informatics, ASU Leadership Academy
- 2016 – 2021 Founding director, The Urban Science Working Group @ ASU

2013 – 2014	co-Chair, 5-year strategic planning committee on Cities and Urban Science, Global Institute of Sustainability
2012 – 2015	Founding faculty advisor, Interdisciplinary Complexity Science Student Organization
2012 – 2014	Director, Complexity Science Speaker Series, Center for Social Dynamics & Complexity
2008	Faculty search committee for Environmental Economics, School of Life Sciences
2007	Symposium judge, Research in Interdisciplinary Science & Engineering symposium
2006 – 2008	Undergraduate mentor, Undergraduate Research Scholars program, Barrett Honors College
2006 – 2008	Founding director, Student Organization for Computational Social Science
2005 – 2006	Task force to establish the inaugural curriculum for the School of Sustainability
2005 – 2006	Director, Current topics in Life Sciences seminar series, School of Life Sciences
2003	Curator and specimen collector, Lichen Herbarium

SERVICE – COMMUNITY AND OTHER OUTREACH

2017	Judge, <i>MathCounts</i> regional competition. Rochester Community and Technical College. Rochester, Minnesota. Feb. 3, 2017.
2013 – 2020	Volunteer librarian, Broadmor Elementary School, Tempe, Arizona
2013 – 2014	Chair, External Audit Committee. Broadmor Elementary School PTA, Tempe, Arizona.
2012 – 2013	External faculty advisor, E.A.R.T.H. Club, Mesa Westwood High School, Mesa, Arizona.
2001 – 2003	Chemistry and Math Tutor. Math & Science Help Center, Scottsdale Community College, Scottsdale, Arizona.
1990 – 1991	Board of Directors, Treasurer, and Finance Chairman, Big Brothers/Big Sisters, Seymour, Indiana.

PROFESSIONAL MEMBERSHIPS – PAST AND PRESENT

Complex Systems Society (CSS)
Western Regional Science Association (WRSA)
Computational Social Science Society of the Americas (CSSSA)
Community Indicators Consortium (CiC)
On Sustainability Knowledge Community
European Complex Systems Society (CSS)
American Association for the Advancement of Science (AAAS)
National Center for Faculty Development & Diversity
American Association of Geographers (AAG)
North American Association for Computational Social and Organizational Sciences (NAACSOS)
International Network for Social Network Analysis (INSNA)
Association for Evolutionary Economics (AFEE)
American Geophysical Union (AGU)
Institute of Management Accountants (IMA)
Association for Operations Management (formerly APICS)

PROFESSIONAL DESIGNATIONS AND CERTIFICATIONS

1995	Certified Management Accountant (CMA), Institute of Management Accountants.
1994	Certification in Structured Query Language (SQL), Oracle Education.
1994	Certification in Relational Database Architecture, Oracle Education.

LANGUAGES

English – native speaker
German – basic proficiency