


# Shade T. Shutters, PhD, CMA


## Research Scientist

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## ACADEMIC APPOINTMENTS

### Current, primary (split)

2023 – Director, Regional Transformations at Decision Theater, Arizona State University  
2014 – Research Scientist, School of Complex Adaptive Systems, Arizona State University

### Current, secondary

2019 – External Research Faculty, The Global Climate Forum, Berlin, Germany

### Current, secondary affiliations at Arizona State University

2020 – Founding Director, Laboratory for Regional Dynamics and Development  
2019 – Founding co-Director, Complexity Economics Lab  
2018 – Faculty Affiliate, Center on Smart Cities and Regions  
2014 – Faculty Affiliate, Center on Technology, Data and Society (formerly Center for Policy Informatics)  
2013 – Senior Sustainability Scientist, Global Institute of Sustainability and Innovation  
2011 – Core Faculty, Center for Social Dynamics & Complexity

### Previous

2018 – 2021 Science Officer, National Laboratory for Education Transformation, Carmel, California, USA  
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)

## EDUCATION

### PhD, Biology (Urban Ecology), 2009

Arizona State University  
NSF Predoctoral Fellowship – 3 years  
IGERT Fellow in Urban Ecology – 3 years

### BS, Business Administration, 1990

Indiana University  
Majors: Finance, Accounting  
Minors: Economics, Psychology

## EDITORIAL APPOINTMENTS

2023 – **PLOS Complex Systems**, Editorial Board and Associate Editor  
2016 – **Urban Science**, Editorial Board and Associate Editor  
- Editor for Urban Modeling and Simulation  
2015 – **Nature Humanities & Social Sciences Communications**, Editorial Board and Associate Editor  
- Editor for Complex Networks topical area

## 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 <sup>nd</sup> 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 <sup>nd</sup> highest score in USA, 1995 Uniform CMA Exam	

## REFEREED JOURNAL PUBLICATIONS

49. SO Altiparmak, K Waters, **ST Shutters**, CG Thies (2023) The Green Mirage: The EU's Complex Relationship with Palm Oil Biodiesel in the Context of Environmental Narratives and Global Trade Dynamics. *In review*
48. S Pourshahabi, **ST Shutters**, R Muneeppeerakul (2023) Uncovering economic vulnerabilities induced by interdependent networks. *In review*
47. Z Neal, A Berger, B Butterfield, D Garlaschelli, N Gotelli, F Saracco, T Squartini, **ST Shutters**, W Ulrich, G Wang, G Strona (2023) Pattern Detection in Bipartite Networks: A Review of Terminology, Applications and Methods. *In review*. Preprint available at: doi:10.48550/arXiv.2310.01284
46. J Wang, J Lobo, **ST Shutters**, D Strumsky (2023) Fueling a Net-Zero Future: The Influence of Publicly Funded Research on Clean Energy Inventions. *In review*
45. SO Altiparmak, K Waters, CG Thies, **ST Shutters** (2023) Cornering the Market with Foreign Direct Investments: China's Cobalt Politics. *In review*
44. SO Altiparmak, CG Thies, K Waters, **ST Shutters** (2023) The geoeconomics of renewable energy: China's involvement in the European Union market. *In review*
43. **ST Shutters** (2023) Using multidimensional networks to better understand constraints and possibilities of urban development. *In review*. Preprint available at doi:10.2139/ssrn.4315920
42. K Waters, **ST Shutters** (2023) Global Coal Trade Distributions from 1988 to 2021. *In review*
41. D Rybski, DP Helmers, P Pradhan, **ST Shutters**, V Radeloff, V Butsic (2022) Employment and land use in the United States: cross-sectional and short-term trends reveal the importance of the 96th Meridian. *In review*. Preprint available at doi:10.48550/arXiv.2212.01148
40. **ST Shutters**, J Lobo (2022) Transitioning to a Green Economy: Radical Transformation or Building Upon Existing Skills? *In review*. Preprint available at doi:10.2139/ssrn.4097137
39. SO Altiparmak, CG Thies, **ST Shutters**, K Waters (2023) Inducing New Bilateral Oil Interdependencies: The unintended impact of 2014 US-led sanctions on Russia. *Journal of Indo-Pacific Affairs* 6(3):154-165

38. **ST Shutters**, K Waters (2022) Industrial structure and a tradeoff between productivity and resilience. *Studies in Business and Economics* 17(3):224-240, doi:10.2478/sbe-2022-0057
37. M Rogov, C Rozenblat, M Bida, **ST Shutters** (2022) Evaluating multi-level resilience of Russian urban economies 2010-2019. *Ecology and Society* 27(4):37, doi:10.5751/ES-13691-270437
36. K Waters, **ST Shutters** (2022) Regional Economic Tightness from Rural to Urban Regions. *Urban Transformations* 4:15, doi:10.1186/s42854-022-00044-6
35. K Waters, **ST Shutters** (2022) Skills-Approximate Occupations: Using Networks to Guide Jobs Retraining. *Applied Network Science* 7(1):1-13, doi:10.1007/s41109-022-00487-7
34. **ST Shutters**, K Waters, R Muneeppeerakul (2022) Triad analysis of global energy trade networks and implications for energy trade stability. *Energies* 15(10):3673, doi:10.3390/en15103673
33. **ST Shutters**, JM Applegate (2022) The Urban Wage Premium is Disappearing in U.S. Micropolitan Areas. *Plos One* 17(4):e0267210, doi:10.1371/journal.pone.0267210
32. K Waters, **ST Shutters** (2022) Impacts of Skills Centrality on Regional Economic Productivity and Occupational Income. *Complexity* 2022:5820050, doi:10.1155/2022/5820050
31. **ST Shutters**, JM Applegate, E Wentz, M Batty (2022) Urbanization favors high wage earners. *npj Urban Sustainability* 2:6, doi:10.1038/s42949-022-00049-x
30. **ST Shutters** (2021) Modelling long-term COVID-19 impacts on the U.S. workforce of 2029. *Plos One* 16(12):e0260797, doi:10.1371/journal.pone.0260797
29. **ST Shutters**, H Seibert, B Alm, K Waters (2021) Industry interconnectedness and regional economic growth in Germany. *Urban Science* 6(1):1, doi:10.3390/urbansci6010001
28. 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 Shutters**, ME Smith, E Stokes, D Strumsky, J Wu (2021) A Convergence Research Perspective on Graduate Education for Sustainable Urban Systems Science. *npj Urban Sustainability* 1:39, doi:10.1038/s42949-021-00044-8
27. D Rybski, P Pradhan, **ST Shutters**, V Butsic, JP Kropp (2021) Characterizing the sectoral development of cities. *Plos One* 16(7):e0254601, doi:10.1371/journal.pone.0254601
26. **ST Shutters**, S Kandala, F Wei, AP Kinzig (2021) Resilience of Urban Economic Structures Following the Great Recession. *Sustainability* 13(4):2374, doi:10.3390/su13042374
25. DT Painter, **ST Shutters**, E Wentz (2021) Innovations and Economic Output Scale with Social Interactions in the Workforce. *Urban Science* 5(1):21, doi:10.3390/urbansci5010021
24. **ST Shutters**, K Waters (2020) Inferring networks of interdependent labor skills to illuminate urban economic structure. *Entropy* 22(10):1078, doi:10.3390/e22101078
23. H Wang, Y Lu, **ST Shutters**, M Steptoe, F Wang, S Landis, R Maciejewski (2019) A visual analytics framework for spatiotemporal trade network analysis. *IEEE Transactions on Visualization and Computer Graphics* 25(1):331-341, doi:10.1109/TVCG.2018.2864844
22. **ST Shutters** (2018) Urban Science: Putting the “Smart” in Smart Cities. *Urban Science* 2(4):94, doi:10.3390/urbansci2040094
21. **ST Shutters**, J Lobo, R Muneeppeerakul, D Strumsky, C Mellander, M Brachert, T Farinha-Fernandes, LMA Bettencourt (2018) Urban occupational structures as information networks: The effect on network density of increasing number of occupations. *Plos One* 13(5):e0196915, doi:10.1371/journal.pone.0196915
20. S Candan, **ST Shutters**, C Fortunato (2017) A Flexible Data-Centric Approach for Modeling and Analyzing Hyper Connected Megacities. *Small Wars Journal* 13(7):14-Jul-2017

19. **ST Shutters** (2016) Interdependent Preferences and Prospects for Global Sustainability. *International Journal of Sustainability Policy and Practice* 12(3):25-39, doi:10.18848/2325-1166/CGP/v12i03/25-39
18. **ST Shutters**, R Muneeppeerakul, J Lobo (2016) Constrained pathways to a creative urban economy. *Urban Studies* 53(16):3439-3454, doi:10.1177/0042098015616892
17. **ST Shutters**, R Muneeppeerakul, J Lobo (2016) How hard is it for urban economies to become “green”? *Environment and Planning B: Urban Analytics and City Science* 43(1):198-209, doi:10.1177/0265813515600108
16. **ST Shutters**, W Herche, E King (2016) Anticipating Megacity Responses to Shocks: Using Urban Integration and Connectedness to Assess Resilience. *Small Wars Journal* 12(2):26-Feb-2016
15. 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) The New Global Urban Realm: Complex, Connected, Diffuse, and Diverse Social-Ecological Systems. *Sustainability* 7(5):5211-5240, doi:10.3390/su7055211
14. **ST Shutters**, R Muneeppeerakul, J Lobo (2015) Quantifying urban economic resilience through labour force interdependence. *Humanities and Social Sciences Communications* 1(201510):1-7, doi:10.1057/palcomms.2015.10
13. **ST Shutters**, D Hales (2015) Altruism displays a harmonic signature in structured societies. *Journal of Artificial Societies and Social Simulation* 18(3):2, doi:10.18564/jasss.2780
12. BB Cutts, T Muñoz-Erickson, **ST Shutters** (2015) Public Representation in Water Management – A Network Analysis of Organization and Public Perceptions in Phoenix, Arizona. *Society and Natural Resources* 28(12):1340-1357, doi:10.1080/08941920.2015.1020581
11. M Qubbaj, **ST Shutters**, R Muneeppeerakul (2014) Living in a network of scaling cities and finite resources. *Bulletin of Mathematical Biology* 77(2):390-407, doi:10.1007/s11538-014-9949-3
10. R Muneeppeerakul, J Lobo, **ST Shutters**, A Gómez-Liévano, M Qubbaj (2013) Urban Economies and Occupation Space: Can They Get “There” from “Here”? *Plos One* 8(9):e73676, doi:10.1371/journal.pone.0073676
9. **ST Shutters** (2013) Collective action and the detrimental side of punishment. *Evolutionary Psychology* 11(2):327-346, doi:10.1177/147470491301100204
8. **ST Shutters** (2013) Cultural polarization and the role of extremist agents: a simple simulation model. *Lecture Notes in Computer Science* 7812:93-101, doi:10.1007/978-3-642-37210-0\_11
7. **ST Shutters** (2013) Towards a rigorous framework for studying continuous 2-player games. *Journal of Theoretical Biology* 321:40-43, doi:10.1016/j.jtbi.2012.12.026
6. **ST Shutters**, D Hales (2013) Tag-mediated altruism is contingent on how cheaters are defined. *Journal of Artificial Societies and Social Simulation* 16(1):4, doi:10.18564/jasss.2090
5. D Hales, **ST Shutters** (2013) Cooperation through the endogenous evolution of social structure. *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. **ST Shutters**, R Muneeppeerakul (2012) Agricultural trade networks and patterns of economic development. *Plos One* 7(7):e39756, doi:10.1371/journal.pone.0039756
3. **ST Shutters** (2012) Punishment leads to cooperative behavior in structured societies. *Evolutionary Computation* 20(2):301-319, doi:10.1162/EVCO\_a\_00062
2. **ST Shutters** (2009) Strong reciprocity, social structure, and the evolution of fair allocations in a simulated ultimatum game. *Computational and Mathematical Organization Theory* 15(2):64-77, doi:10.1007/s10588-008-9053-z

1. **ST Shutters**, RC Balling, Jr. (2006) Weekly cycling of environmental variables in Phoenix, Arizona. *Atmospheric Environment* 40(2):304-310, doi:10.1016/J.ATMOENV.2005.09.037

#### OTHER REFEREED PRODUCTS

10. **ST Shutters**, J Lobo, J Wang (2023) The Role of Occupational Socialness on the Productivity of Metropolitan Economies. *SSRN Electronic Journal*, doi:10.2139/ssrn.4659919
9. K Waters, **ST Shutters**, T Clower (2022) Coal Trade Networks and Trading Communities: The case of Australia. *Western Regional Science Association, 2022 Conference*. Scottsdale, Arizona. Feb. 27, 2022
8. T Slaper, R Zipper, **ST Shutters** (2021) Augmenting regional clusters with intellectual property and labor force skills specializations. *European Regional Science Association, 2021 Conference*. Bolzano, Italy. Aug. 25, 2021. <https://az659834.vo.msecnd.net/eventsairwesteuprod/production-ersa-public/9446f38e9f904e6ca9ed358dcf2a9e29>
7. K Waters, **ST Shutters** (2021) Impacts of Skills Centrality on Regional Economic Productivity: A Complex Systems Approach. *Mid-Continent Regional Science Association, 2021 Conference*. Online. Jun. 11, 2021
6. 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) Urban Science: Integrated Theory from the First Cities to Sustainable Metropolises. *SSRN Electronic Journal*, doi:10.2139/ssrn.3526940
5. 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) Graduate Education for a New Sustainable Urban Systems Science: Designing a New PhD Curriculum Integrating Sustainability Science and Urban Science. *SSRN Electronic Journal*, doi:10.2139/ssrn.3466322
4. M Rogov, C Rozenblat, **ST Shutters** (2019) Multi-level approach to urban resilience: conceptual and operational model. *American Association of Geographers, 2019 Conference*, Session on Cities and Networks. Washington, DC. Apr. 6, 2019
3. **ST Shutters**, M Halás (2011) From cells to states: A unifying framework of social relativity. *European Consortium for Political Research, 2011 General Conference*, University of Iceland, Reykjavik, Iceland. Aug. 27, 2011. doi:10.13140/2.1.1990.9126
2. **ST Shutters** (2009) Punishment, rational expectations, and relative payoffs in a networked prisoners dilemma. *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
1. **ST Shutters**, BB Cutts (2008) A simulation model of cultural consensus and persistent conflict. 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>

#### BOOKS, CHAPTERS, POPULAR SCIENCE, REPORTS, etc.

20. **ST Shutters**, SO Altiparmak (2023) A U.S. clean energy transition can enhance national security but it's not the bulletproof strategy you might think. *Modern Diplomacy*, 07-Dec-2023. <https://modern diplomacy.eu/2023/12/07/a-u-s-clean-energy-transition-can-enhance-national-security-but-its-not-the-bulletproof-strategy-you-might-think/>
19. **ST Shutters** (2021) A tale of two states: The Impact of #RedForEd on Arizona and Oklahoma. *LinkedIn Pulse*. <https://www.linkedin.com/pulse/tale-two-states-impact-redforded-arizona-oklahoma-shade-t-shutters>
18. AP Kinzig, **ST Shutters** (2021) Coronavirus and the Public Good. In *Resilience Matters: Reimagining the Future in a Tumultuous Year* 147-148. L Mazur, ed. Island Press. Washington, DC

17. 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). *A Knowledge Exchange Playbook to Build Resilience*. <https://hdl.handle.net/2286/R.2.N.160839>. M Hinrichs, P Solis, eds. Global Council for Science and the Environment. Washington, DC
16. J Miller, SM Ravich, **ST Shutters**, B Ruddell, A Fixler (2021) Who Gets Their Lights Back First if a Cyberattack Brings Down the Grid? *Slate Magazine*. 19-Jan-2021. <https://slate.com/technology/2021/01/us-government-continuity-economy-plan-cyberattack.html>
15. AP Kinzig, **ST Shutters** (2020). Coronavirus and the Public Good. *The Progressive*. 18-Mar-2020. <https://progressive.org/op-eds/coronavirus-public-good-kinzig-shutters-200318/>
14. **ST Shutters**, L Mazur (2018) Interdependence and Its Discontents. In *Resilience Matters: Transformative Thinking in a Year of Crisis* 12-16. L Mazur, ed. Island Press. Washington, DC
13. **ST Shutters** (2018) What’s so smart about “smart” cities? *LinkedIn Pulse*. <https://www.linkedin.com/pulse/whats-so-smart-cities-shade-t-shutters/>
12. **ST Shutters** (2018) Workforce Automation and the Mix of College Degrees. *LinkedIn Pulse*. <https://www.linkedin.com/pulse/workforce-automation-mix-college-degrees-shade-t-shutters/>
11. **ST Shutters**, L Mazur (2017) Human society is totally interdependent—that’s a huge advantage, but also a huge survival risk. *Quartz Ideas*, 02-May-2017. <https://tinyurl.com/knw78ne>
10. **ST Shutters**, DD White, R Halden, A Venkatesan (2016) Report on Sociocultural Modeling for Dense Urban Areas. Arizona State University Technical Report to U.S. Army Training and Doctrine Command
9. R Florida, **ST Shutters**, G Spencer (2016) Pathways to Ontario’s Knowledge Economy: A system for identifying existing regional strengths and future prospects. Martin Prosperity Research Working Paper Series, 2016-MPIWP-001. Martin Prosperity Institute, Rotman School of Management, University of Toronto. <https://tinyurl.com/wvnt422d>
8. **ST Shutters** (2016) United we fall, divided we stand: Resilience and the role of interdependence. *International Urban Resilience Research Network, Viewpoints*. <https://t.co/49BhQzfgyK>
7. **ST Shutters** (2015) Cities which plan to transform into a creative engine of innovation may face a long and difficult journey. *London School of Economics, US Centre, Daily Blog on US Politics and Policy*. <http://bit.ly/1IUgMQ7>
6. **ST Shutters** (2013) Emergence: Religion as a Superorganism. *Conference on Emergent Approaches to Human Sociality and Religion*. Tempe, Arizona. Oct. 6, 2013, <https://ssrn.com/abstract=4332962>
5. **ST Shutters** (2012) Conflict, Collapse, Networks, and Governance: 20,000,000 Humans in a Virtual Petri Dish
4. **ST Shutters** (2010) From terrorism to environmental management: A novel assessment of network robustness using triad analysis. doi:10.13140/2.1.4647.0088
3. **ST Shutters** (2009) Strong Reciprocity, Social Structure, and the Evolution of Cooperative Behavior. *Doctoral Dissertation, School of Life Sciences, Arizona State University*. doi:10.13140/2.1.5185.7920
2. **ST Shutters**, A Gitch (1998) Maximizing order entry efficiency using standard value rule sets. In *Oracle Applications User Group Fall 1998 USA Conference Proceedings*. OAUG. San Diego, California
1. **ST Shutters**, D Richards (1997) Facing the challenges of changing fiscal year. In *Oracle Applications Users Group Fall 1997 USA Conference Proceedings*. OAUG. Orlando, Florida

## SOFTWARE, DATASETS, and SPECIMEN COLLECTIONS

7. **ST Shutters** (2023) Invention Disclosure: A method for forecasting an industry's potential for job growth in a given region. Skysong Innovations (SI) Tech ID: M24-116P



6. **ST Shutters** (2023) Natural history specimens collected and/or identified and deposited [Data set]. *Zenodo*, doi:10.5281/zenodo.10247189
5. **ST Shutters** (2021) Replication Data for: Modelling long-term COVID-19 impacts on the U.S. workforce of 2029. *Harvard Dataverse*, V1, doi:10.7910/DVN/DVHBZT
4. DT Painter, **ST Shutters**, E Wentz (2021) Author Classifications of O\*NET Individual Work Activities (IWA) used in “Innovations and Economic Output Scale with Social Interactions in the Workforce”. *Zenodo*, version 1, doi:10.5281/zenodo.4434706
3. **ST Shutters**, J Lobo, R Muneeppeerakul, D Strumsky, C Mellander, M Brachert, T Farinha-Fernandes, LMA Bettencourt (2018) Replication Data for: Urban Occupational Structures as Information Networks. *Harvard Dataverse*, V1, doi:10.7910/DVN/APJZC8
2. **ST Shutters**, D Hales (2015) The emergence of tag-mediated altruism in structured societies (Version 1.2.0). *CoMSES Computational Model Library*. <https://www.comses.net/codebases/4510/releases/1.2.0/>
1. **ST Shutters**, R Muneeppeerakul, J Lobo (2015) Replication Data for: Quantifying urban economic resilience through labour force interdependence. *Harvard Dataverse*, V1, doi:10.7910/DVN/HEWGDD

## PUBLICITY AND PRESS COVERAGE

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

## GRANTS AND FUNDING (\* = PI, otherwise co-PI/co-author)

Sum of proposals (awarded and pending only): PI - \$4.4M | coPI - \$38.0M | co-Author - \$6.7M

20. V Mueller\*, **ST Shutters**, F Hussain, A Villacis Aveiga (2022) *DISES: Salinity as a Driver of Coastal Inequality*. \$446,851. US National Science Foundation. Duration 36 months. Funding pending
19. C Miller\*, **ST Shutters**, JM Applegate, D Bednar, D Hernandez-Cortes, K Jalbert, L Keeler, J Richter (2022) *Center for Accelerating Convergent Transitions in Energy & Society (CACTES)*. \$30,050,000. US National Science Foundation. Duration 60 months. Funding pending.
18. **ST Shutters**\*, M Simeone (2022) *Decision Support Tools for Cities Transitioning to Clean Energy*. \$133,000. Zimin Institute for Smart & Sustainable Cities. Duration 12 months.
17. **ST Shutters**\*, R Muneeppeerakul, C Thies (2021) *Growing Chinese Economic Power and the Exacerbating Effects of US Economic Interdependence*. \$1,266,800. US Department of Defense, Minerva Research Initiative. Duration 36 months.
16. **ST Shutters**\*, D Strumsky (2020). *RAPID: Tacit Knowledge Transfer and COVID-19 Impacts on US Invention*. \$123,000. US National Science Foundation. Duration 24 months. (Assigned as PI after departure of original PI).
15. **ST Shutters**\* (2019). *A complexity approach to resilience of urban economies*. \$47,500. Virginia G. Piper Charitable Trust. Duration 18 months.
14. Several coPIs, **ST Shutters** (2019) *Building Critical Mass at the Complexity Science Hub Vienna—Establishing and Expanding Complexity Science in Austria*. €4,600,000 (\$5,200,000). FTF Austrian Science Fund. Duration 72 months.
13. **ST Shutters**\* (2019) *Expanding the Boundaries of Regional Economic Development: Integrating Complex Adaptive Systems*. \$29,500. US Dept. of Commerce, Economic Development Administration. (Subaward through Indiana University). Duration 18 months.
12. J Miller\*, E Johnston, **ST Shutters** (2017) *Achieve60AZ decision modeling platform*. \$550,000. Arizona Board of Regents. Duration 12 months.
11. J Miller\*, E. Johnston, **ST Shutters** (2017) *Center for Educational Excellence powered by Helios*. \$2,350,000. Helios Foundation. Duration 36 months.
10. **ST Shutters**\*, S Burke, C Thies (2017) *Economic System Security in the 21<sup>st</sup> Century*. \$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. J Miller\*, **ST Shutters**, R Salla, K Candan, D Boscovic (2017) *ASU Decision Theater – US Army TRADOC Partnership/Megacities*. \$624,999. US Department of Defense, US Army Training and Doctrine Command. Duration 12 months.
8. **ST Shutters**\* (2016) *Metroinsight: Knowledge discovery and real-time interventions from sensory data flows in urban spaces*. \$179,100. US National Science Foundation. Duration 24 months.
7. B Ruddell\*, **ST Shutters**, J Sabo, K Gurney, WM Hanemann (2016) *Mesoscale Data Fusion to Map and Model the US FEW system (INFEWSion)*. \$3,000,000. US National Science Foundation. Duration 48 months.
6. **ST Shutters**\*, R Maciejewski (2016) *Exacerbation and export of localized climate change impacts through agricultural trade networks*. \$93,200. Skoll Global Threats Fund (unsolicited). Duration 12 months.
5. R Halden\*, DD White, **ST Shutters**, M Dalrymple, P Shakarian (2015) *US Army and Megacities: Planning for 2040*. \$491,000. US Department of Defense (unsolicited). Duration 12 months.
4. **ST Shutters**\*, R Muneeppeerakul (2013) *Decision support for regional transboundary issues: Towards a new science of intercity relations*. \$500,000. Walton Sustainable Solutions Initiative. Duration 36 months.
3. **ST Shutters**\*, M Barton, M Laubichler (2012) *Phase transitions and allometry in social systems*. \$43,467. Arizona State University, College of Liberal Arts & Sciences Seed Funding. Duration 12 months.



2. J Touza\*, **ST Shutters** (2010) *Socio-economic Factors in Designing Control Strategies for Forest Pathogens*. Convocatoria de ayudas de Proyectos de Investigación Fundamental no orientada. €900,000. Duration 36 months.
1. **ST Shutters\*** (2009) *Assessing robustness and evolutionary trajectories of complex social-ecological networks through triad motif analysis*. National Institute for Mathematical and Biological Synthesis. \$130,000. Duration 24 months. (Subsequently declined to pursue postdoc at the University of Vigo).

## PRESENTATIONS – INVITED ONLY

39. *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
38. *Linking networks to uncover cryptic risks and vulnerabilities* (2023) 2023 U.S. Air Force Trust & Influence Program Review. US Air Force Academy, Colorado Springs, Colorado. Aug. 15, 2023.
37. *Using Networks to Assess Resilience and Vulnerabilities of Global Trade* (2022) 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* (2022) 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?* (2021) The Sustainability and Security Forum. (Panelist). Washington, DC. Oct. 21, 2021.
34. *Security implications of U.S. Economic Interdependence* (2021) 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* (2021) Complexity Science Hub-Vienna. Vienna, Austria. Feb. 19, 2021.
32. *Urban Resilience Tools for Economic Development Planning*. (2020) U.S. Economic Development Administration, National Research & Technical Assistance Network. (with K Waters) Washington, DC. Oct. 29, 2020.
31. *Biological Rationality and Policy Making* (2020) Winter School on Cooperation and Conflict. Tempe, Arizona. Jan. 9, 2020.
30. *Urban Science Curriculum: Perspectives from the Security Community* (2019) NSF Workshop: Graduate Education for a New Sustainable Urban Systems Science. Tempe, Arizona. Sep. 20, 2019.
29. *Complexity methods for comparing urban economies* (2019) Potsdam Institute for Climate Impacts Research. Potsdam, Germany. June 7, 2019.
28. *Computational Approaches to Comparative Urban Analysis* (2019) Oak Ridge National Laboratory. Oak Ridge, Tennessee. Apr. 29, 2019.
27. *Resilience and job growth strategies* (2019) 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*. (2018) NSF PI 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* (2018) Panelist, NSF South Big Data Hub, Data Science Roundtable. Washington, DC. Apr. 12, 2018.
24. *A Dynamic Economy Is a Spectrum of Jobs* (2018) International Economic Development Council. Las Vegas, Nevada. Jan. 29, 2018.
23. *Will our cities survive the 21<sup>st</sup> century?* (2018) Panelist, COMEXI Future Tense Event. Mexico City, Mexico. Jan. 23, 2018.

22. *Labor Analytics for Targeted Job Growth* (2017) Data2work Program. University of Chicago, Chicago, Illinois. Dec. 6, 2017.
21. *Understanding the Labor Composition of Cities* (2017) 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* (2017) Sustainable Cities Network (with K Feige, D Korz) Tempe, Arizona. Sep. 18, 2017.
19. *MetroInsight: Real-time Tools for Urban Decision-making* (2017) NSF West Big Data Innovation Hub Conference. (with R Pasricha) Boulder, Colorado. Jun. 5, 2017
18. *Industry growth decision tools for Greater Phoenix* (2017) WESTMARC Summit on Economic Development. Glendale, Arizona. May 11, 2017
17. *Big Data Tools for Workforce Development: Obstacles and Future Directions* (2017) University of California-San Diego. Lo Jolla, California. Mar. 21, 2017.
16. *MetroInsight: Workforce Analytics for Economic Development* (2017) NSF PI 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* (2016) 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* (2016) 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* (2016) Network Science Institute, Indiana University. Bloomington, Indiana. Feb. 24, 2016.
12. *Understanding and facilitating transitions to sustainable cities* (2015) KTH Royal Institute of Technology. Stockholm, Sweden. Dec. 14, 2015.
11. *Constrained Pathways to a Creative Urban Economy* (2015) IMT Institute for Advanced Studies. Lucca, Italy. Oct. 9, 2015.
10. *Assessing urban economic resilience: lessons from the USA and possibilities for developing regions* (2015) US National Geospatial Intelligence Agency. Springfield, Virginia. Sep. 10, 2015.
9. *Novel methods for understanding and facilitating urban transformations* (2015) The Martin Prosperity Institute. Rotman School of Management. University of Toronto. Toronto, Canada. Jul. 20, 2015.
8. *Labor Sector Interdependencies and Urban Resilience* (2014) Center for Urban Resilience. Loyola Marymount University. Los Angeles, California. Nov. 12, 2014.
7. *Keynote: Emergence: Religion as a superorganism* (2013) Conference on Emergent Approaches to Human Sociality and Religion. Tempe, Arizona. Oct. 6, 2013.
6. *Complexity tools for targeted job growth* (2013) The Greater Phoenix Economic Council. Phoenix, Arizona. June 17, 2013.
5. *Modelling rational agents: Implications for successful environmental governance* (2012) University of Vermont, Burlington, Vermont. Feb. 21, 2012.
4. *Tackling sustainability in the face of competitive forces* (2011) Simpson College, Indianola, Iowa. Mar. 31, 2011.
3. *Punishment, rational expectations, and relative payoffs* (2009) Aptima, Inc., Woburn, Massachusetts. June 12, 2009.

2. *Social structure and the evolution of cooperation* (2008) 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* (2005) Workshop in Political Theory. Indiana University. Bloomington, Indiana. May 21, 2005.

## PRESENTATIONS – CONFERENCES AND WORKSHOPS

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 Munepeerakul). 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* (2022) Southeastern Division, American Association of Geographers, 77<sup>th</sup> Annual Meeting. (with K Waters) Atlanta, Georgia. Nov. 21, 2022
22. *Co-agglomeration Networks* (2022) 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* (2022) 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* (2021) 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* (2021) Mid-Continent Regional Science Association, 51st Annual Meeting. (with K Waters) Online. Jun. 11, 2021.
17. *Regional Economic Tightness from Rural to Populous Regions* (2021) Southern Regional Science Association, 60<sup>th</sup> Annual Meeting. (with K Waters) Online. Apr. 6, 2021.
16. *Skills-Approximate Occupations: Using Networks to Guide Jobs Retraining* (2021) Western Regional Science Association, 60<sup>th</sup> 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* (2020) 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* (2020) 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* (2017) Community Indicators Consortium Fall 2017 Conference. St. Petersburg, Florida. Nov. 16, 2017.

12. *Smart targets: Labor structure constraints on regional specialisation* (2016) 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* (2016) Regional Studies Association 2<sup>nd</sup> North American Conference. (with R Florida, G Spencer) Atlanta, Georgia. Jun. 15, 2016
10. *Analyzing and guiding megacities: Data challenges and possibilities* (2016) 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* (2013) International Conference on Social Computing, Behavioral-Cultural Modeling, & Prediction. Washington, DC. Apr. 3, 2013.
8. *Cooperation through the endogenous evolution of social structure* (2012) 2<sup>nd</sup> 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* (2011) 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* (2010) Computational Social Science Society of the Americas 2010 Conference. (with JT Murphy) Tempe, Arizona. Nov. 6, 2010.
5. *Punishment, rational expectations, and relative payoffs* (2009) 2<sup>nd</sup> International Workshop on Social Computing, Behavioral Modeling, and Prediction. Phoenix, Arizona. Mar. 31, 2009.
4. *A simulation model of cultural consensus and persistent conflict* (2008) 2<sup>nd</sup> 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* (2008) 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?* (2007) Conference for Sustainability IGERTs. University of Alaska. Fairbanks, Alaska. Oct. 12, 2007.
1. *Simulating the effects of strong reciprocity on fair allocations* (2006) 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* (2022) The Unit for Data Science. Oct. 19, 2022.
21. *Why study social insects - Panel* (2022) Social Insect Research Group. Sep. 9, 2022.
20. *Interdependence networks: A complexity approach to understanding urban resilience* (2022) School of Complex Adaptive Systems Faculty Seminar Series. Feb. 18, 2022.
19. *Resilience in Complex Systems: The Case of Urban Economies* (2020) School of Sustainability Research Seminar. Oct. 28, 2020.
18. *Panelist: Resilience as a Design Principle for Smart Cities and Regions* (2019) ASU Smart Cities and Regions Research Workshop. Nov. 12, 2019.
17. *Analytics of Complex Adaptive Systems (and the Networks that Structure Them)* (2015) 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* (2015) Launch ceremony of the ASU Biomimicry Center. (with J. Fewell) Mar. 3, 2015.
15. *Measuring "connectedness": A key to quantifying urban resilience* (2015) ecoSERVICES Group. Feb. 2, 2015.

14. *Evolutionary Psychology meets Behavioral Economics* (2014) Consortium for Biosocial Complexity (with D Kenrick) Feb. 27, 2014.
13. *Urban Reinvention: Complexity tools for targeted job growth* (2013) School of Public Affairs. Nov. 1, 2013.
12. *Using complexity tools to go green: a novel approach to urban growth* (2013) ecoSERVICES Group. Aug. 30, 2013.
11. *Social networks and the evolution of cooperation* (2008) Symposium on Interdisciplinary Research in Science & Engineering. Oct. 17, 2008.
10. *Social structure allows 3<sup>rd</sup> party punishment to flourish* (2008) Graduates in Earth, Life, and Social Sciences Research Symposium. Feb. 1, 2008.
9. *Social structure: A key to strong reciprocity?* (2007) Student Organization for Computational Social Science. Oct. 2, 2007.
8. *Self-enforcing attributes and success of international environmental treaties* (2007) 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* (2006) Student Organization for Computational Social Science. May 12, 2006.
6. *An agent-based model of altruistic punishment* (2005) Urban Ecology Reading Group. 26, 2005.
5. *Weekly cycling of environmental variables in Phoenix, Arizona* (2005) Graduates in Earth, Life, and Social Sciences Research Symposium. Feb. 11, 2005.
4. *The role of automobiles in weekly NO<sub>x</sub> gas cycles in Phoenix, Arizona* (2005) Current Topics in Life Sciences Seminar. Feb. 4, 2005.
3. *Indirect reciprocity in the evolution of cooperation* (2004) Math and Cognition Colloquium. Sep. 28, 2004.
2. *A carbon budget for an urban man-made lake* (2004) 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* (2004) 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

2020-2022    Keith Waters                                      Currently faculty at George Mason University

### Doctoral Committees

Current      Shokoufeh Pourshahabi                      School of Agricultural and Biological Engineering, University of Florida  
*Networks measures of trade induced vulnerabilities*

Current      Jacob Douma                                      School of Geographical Sciences and Urban Planning  
*Labor dynamics of urban economies*

2022           Mehdi Bidi                                      School of Geography - University of Lausanne, Switzerland  
*A micro-level approach of geographical transitions – The case of the evolution of the US system of cities economy over the last two centuries*

2021           Mikhail Rogov                                    School of Geography - University of Lausanne, Switzerland

*Urban resilience: toward a multi-level approach to Russian metropolitan areas facing the economic crisis of 2014-2016*

2019 Claudia ElDib School of Historical, Philosophical, and Religious Studies  
*Dense Urban Environments – focal area to be determined*

2018 Joffa Applegate School of Human Evolution and Social Change  
*Complexity Economics Studies of Firm Dynamics*

2017 Shirley-Ann Behravesch School of Sustainability  
*The influence of organizational culture on the relationship between sustainable business practice bundles and corporate performance*

**Masters Committees**

2017 Travis Seville School of Computing, Informatics & Decision Systems Engineering  
*A visual analytics process for exploring risk and vulnerability in international trade networks*

**Undergraduate Honors Thesis Committees (\* chair)**

2022 Eliana Valenzuela \* School of Life Sciences  
*Sweet Lemonade from Sour Lemons: Improvements to STEM Education Quality Amid the Covid-19 Pandemic*

2022 Joseph Olakkengil College of Education  
*Sweet Lemonade from Sour Lemons: Improvements to STEM Education Quality Amid the Covid-19 Pandemic*

2020 Jairo Ramirez-Torres School of Electrical Engineering  
*Assessing the Economic Risks of Counties in the United States to a Loss of Fossil Fuel Dependence for Energy Production*

2018 Jason Li School of Business  
*Exploratory Analysis of My Google Takeout Search History*

2017 Sagarika Kadambi School of Computing, Informatics & Decision Systems Engineering  
*Visual analytics and the impact of inter-Country trade on violence*

2014 Jacob McAuliffe School of Life Sciences  
*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.*

**Research Experience for Undergraduates (REU) Supervision**

2023 – Anushka Singh School of Complex Adaptive Systems  
*Impact of trade interdependence on global stock markets*

2021 – 2023 Miles McAnulty School of Politics and Global Studies  
*Energy Alignments for Space-Based Solar Power*

2021 – 2022 Erwann Guettouche School of Mathematical and Statistical Sciences  
*Forecast of Clean Energy Consumption in China Using an Optimized Grey Dynamic Model*

2021 – 2022 Gabriel White School of Computing, Informatics & Decision Systems Engineering  
*A Brief Overview of World Trade 2008-2020*

2017 – 2018 Nadira Khan School of Politics and Global Studies  
*Accumulation of coercive economic power by China in Africa*

2008 – 2009 Alexandra Glorioso Department of Economics  
*Self-enforcing attributes and success of international environmental treaties*

**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**

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**

2023 *Shaping Regional Transformations*. German Federal Ministry of Economic Affairs and Climate Impacts. Rostock, Germany. Sep. 13-14, 2023.  
 2022 *“A Data Analyst, a Sociologist, and a Planner Walk into a...”*: *New Collaborations in Urban Research*. Berlin, Germany. May 12-14, 2022.  
 2019 *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.



- 2019 *Evolution of the Global Economy in the 21<sup>st</sup> Century*. Global Climate Forum. Berlin, Germany. June 3-14, 2019.
- 2019 *Regional Economic Development – Future Directions and Goals*. U.S Dept. of Commerce, Economic Development Administration. Arlington, Virginia. Apr. 2-3, 2019.
- 2019 *Dense Urban Environment Advisory Board Meeting*. US Army Asymmetric Warfare Group (AWG). Ft. Hamilton, New York. Jan 31, 2019.
- 2018 *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.
- 2018 *Workshop to Develop a Graduate Curriculum on Dense Urban Areas*. ASU Research Enterprise. Tempe, Arizona. Feb. 28 – Mar. 1, 2018.
- 2018 *Opportunity data for modeling the future of work*. National Laboratory for Educational Transformation. San Diego, California. Feb. 27, 2018.
- 2017 *Developing Arizona's Human Capital*. Arizona Commission for Postsecondary Education. Scottsdale, Arizona. Dec. 7-8, 2017.
- 2017 *Innovation, Cities, and the Future of Work*. MIT. Cambridge, Massachusetts. Nov. 14-15, 2017.
- 2017 *The Future of Urban Network Research*. Ghent University. Ghent, Belgium. Sep. 17-20, 2017.
- 2017 *Economics Research Boot Camp*. Jonkoping University. Jonkoping, Sweden. Aug. 23-24, 2017.
- 2016 *B2B Data Sharing for Smart Cities and the Internet of Things*. Orange Silicon Valley. San Francisco, California. Oct. 24, 2016.
- 2016 *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.
- 2016 *Human Socio-Cultural Modeling for Dense Urban Areas*. US Army Intelligence Center of Excellence. Scottsdale, Arizona. Aug. 2-3, 2016.
- 2016 *Physical Factors of Megacities/Dense Urban Areas*. US Army Intelligence Center of Excellence. Scottsdale, Arizona. July 7, 2016.
- 2016 *US Army TRADOC Mad Scientist workshop on Megacities*. Scottsdale, Arizona. Apr. 21-22, 2016.
- 2015 *Megacities Workshop: Geospatial Analytics Applied to Urban Environments*. US National Geospatial Intelligence Agency. Springfield, Virginia. Sep. 9-10, 2015.
- 2014 *Collective Behavior: From Cells to Societies*. US National Academies, Keck Futures Initiative. Huntington Beach, California. Nov. 12-15, 2014.
- 2014 *Sustainable Cities Network Annual Conference*. Tempe, Arizona. Sep. 23, 2014.
- 2014 *Workshop on Urban Innovation and Patent Analytics*. Santa Fe Institute. Santa Fe, New Mexico. July 7-8, 2014.
- 2014 *Urban Sciences Research Coordination Network annual workshop*. Urban Center for Computation and Data. Chicago, Illinois. June 10-11, 2014.
- 2014 *Urban Sustainability Research Coordination Network biennial all-hands meeting*. Arizona State University. Tempe, Arizona. Mar. 9-11, 2014.
- 2013 *Creating the Cities of Tomorrow*. Walton Sustainable Solutions Initiatives. Carefree, Arizona. Aug. 11-14, 2013.

- 2013 *Conceptual Models of Urban Systems*. Urban Sustainability Research Coordination Network working group. North Carolina State University. Raleigh, North Carolina. May 5-7, 2013.
- 2013 *Urbanization, Sustainability, Resilience, and Prosperity*. Walton Sustainable Solutions Initiatives. Tempe, Arizona. Apr. 17-19, 2013.
- 2012 *Complex networks, embedded resource trade, and ecosystems: understanding the sustainability and resilience of urban networks*. Arizona State University. Tempe, Arizona. Nov. 1-2, 2012.
- 2011 *Managing the Hive: Organization of work in business and eusocial colonies*. Arizona State University. Tempe, Arizona. May 4-5, 2011.
- 2011 *Global Collective Action and Sustainability*. Arizona State University, Tempe, Arizona. Mar. 11, 2011.
- 2009 *International Workshop on the Group as Individual in Social Dynamics*. Arizona State University, Tempe, Arizona. May 1-2, 2009.
- 2008 *1<sup>st</sup> International Workshop on Social Computing, Behavioral Modeling, and Prediction*. Phoenix, Arizona. Apr. 1-2, 2008.
- 2008 *The Group as Individual: Workshop on Multilevel Selection*. Arizona State University. Tempe, Arizona. Mar. 19-20, 2008.
- 2005 *Empirical techniques for testing agent-based models*. Indiana University. Bloomington, Indiana. June 2-4, 2005.
- 2005 *Summer Institute on Agent-based Modeling and Natural Resources*. Indiana University. Bloomington, Indiana, May 16-June 1, 2005.
- 2004 *Complex Adaptive Social Systems*. Indiana University. Bloomington, Indiana. Oct. 14-15, 2004.
- 2004 *Managing for Resilience: An Integrated Approach to Coastal Marine Science and Conservation*. University of Washington. Friday Harbor, Washington. Aug. 23-27, 2004.

### SERVICE – PROFESSIONAL

- 2019 – 2020 Workshop organizer and program chair, *Workshop on non-Euclidian mapping of urban economies*. Complexity Science Hub, Vienna, Austria. Mar. 3 – 4, 2020.
- 2018 Organizing committee, *Workshop to develop a graduate curriculum on Dense Urban Areas*. Tempe, Arizona. Feb. 28 – Mar. 1, 2018.
- 2017 – 2018 Guest Editor, *Urban Science* 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* • *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, *MathCounts* 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