Geoff Boeing

School of Public Policy and Urban Affairs
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EDUCATION

Ph.D. City and Regional Planning, University of California, Berkeley, 2017
Dissertation: *Methods and Measures for Analyzing Complex Street Networks and Urban Form*
Committee: Paul Waddell (chair), Robert Cervero, Elizabeth Macdonald, David O'Sullivan

M.S. Information Management, Arizona State University, 2006

B.S. Computer Information Systems *summa cum laude*, Arizona State University, 2004

ACADEMIC APPOINTMENTS

2018– Northeastern University
Assistant Professor, School of Public Policy and Urban Affairs
Faculty Affiliate, Network Science Institute
Faculty Affiliate, Global Resilience Institute
Core Faculty, NULab for Texts, Maps, and Networks

2017–18 University of California, Berkeley
Postdoctoral Scholar, Department of City and Regional Planning

RESEARCH/TEACHING INTERESTS

Urban informatics and planning

History and theories of urban form and street network design

Spatial data science: computational statistics, machine learning, big data, visualization, spatial analysis

Complex systems: complexity theories of cities, systems thinking, network science

PUBLICATIONS

Peer-Reviewed Journal Articles

2018 Boeing, G. "Planarity and Street Network Representation in Urban Form Analysis." *Environment and Planning B: Urban Analytics and City Science*, published online before print. doi:10.1177/2399808318802941

2018 Boeing, G. "Measuring the Complexity of Urban Form and Design." *Urban Design International*, published online before print. doi:10.1057/s41289-018-0072-1

2018 Boeing, G. "A Multi-Scale Analysis of 27,000 Urban Street Networks: Every US City, Town, Urbanized Area, and Zillow Neighborhood." *Environment and Planning B: Urban Analytics and City Science*, published online before print. doi:10.1177/2399808318784595

2018 Boeing, G. "The Effects of Inequality, Density, and Heterogeneous Residential Preferences on Urban Displacement and Metropolitan Structure: An Agent-Based Model." *Urban Science*, 2 (3), 76. doi:10.3390/urbansci2030076

2018 Boeing, G. "Pynamical: Model and Visualize Discrete Nonlinear Dynamical Systems, Chaos, and Fractals." *Journal of Open Source Education*, 1 (1), 15. doi:10.21105/jose.00015

2017 Boeing, G. "OSMnx: New Methods for Acquiring, Constructing, Analyzing, and Visualizing Complex Street Networks." *Computers, Environment and Urban Systems* 65, 126–139. doi:10.1016/j.compenvurbsys.2017.05.004

2017 Boeing, G. and P. Waddell. "New Insights into Rental Housing Markets across the United States: Web Scraping and Analyzing Craigslist Rental Listings." *Journal of Planning Education and Research* 37 (4), 457–476. doi:10.1177/0739456X16664789

2017 Boeing, G. "OSMnx: A Python Package to Work with Graph-Theoretic OpenStreetMap Street Networks." *Journal of Open Source Software* 2 (12), 1. doi:10.21105/joss.00215

2016 Boeing, G. "Honolulu Rail Transit: International Lessons from Barcelona in Linking Urban Form, Design, and Transportation." *Planext* 2, 28–47. doi:10.17418/planext.2016.3vol.02

2016 Boeing, G. "Visual Analysis of Nonlinear Dynamical Systems: Chaos, Fractals, Self-Similarity, and the Limits of Prediction." *Systems* 4 (4), 37. doi:10.3390/systems4040037

2014 Boeing, G., D. Church, H. Hubbard, J. Mickens, and L. Rudis. "LEED-ND and Livability Revisited." *Berkeley Planning Journal* 27 (1), 31–55. doi:10.31235/osf.io/jpjhq

Journal Article Manuscripts Under Review

2018 Boeing, G. "Online Rental Housing Market Representation and the Digital Reproduction of Urban Inequality." Revise and resubmit at *Urban Studies*.

2018 Boeing, G., J. Wegmann, and J. Jiao. "Rental Housing Spot Markets: How Online Information Exchanges Can Supplement Transacted-Rents Data." Revise and resubmit at *Journal of Planning Education and Research*.

2018 Boeing, G. "Street Networks and Measures for Every US City, County, Urbanized Area, Census Tract, and Zillow Neighborhood." Under review at *Scientific Data*.

2018 Boeing, G. "Urban Spatial Order: Street Network Orientation, Configuration, and Entropy." Under review at *PLOS One*.

Peer-Reviewed Book Chapters

2018 Boeing, G. "The Morphology and Circuity of Walkable and Drivable Street Networks." In: *Mathematics of Urban Morphology* (forthcoming), edited by L. D'Acci. Cham, Switzerland: Birkhäuser.

2017 Barajas, J. M., G. Boeing, and J. Wartell. "Neighborhood Change, One Pint at a Time: The Impact of Local Characteristics on Craft Breweries." In: *Untapped: Exploring the Cultural Dimensions of Craft Beer* (pp. 155–176), edited by N. G. Chapman, J. S. Lellock, and C. D. Lippard. Morgantown, WV: West Virginia University Press. doi:10.31235/osf.io/v88hh

Peer-Reviewed Conference Proceedings

2019 Boeing, G. "Street Network Patterns, Orientation, and Entropy around the World." Transportation Research Board 98th Annual Meeting. Washington, DC. Jan 13–17.

2018 Boeing, G. "The Relative Circuity of Walkable and Drivable Urban Street Networks." Transportation Research Board 97th Annual Meeting. Washington, DC. Jan 7–11.

Edited Articles and Reviews

2018 Boeing, G. "Estimating Local Daytime Population Density from Census and Payroll Data." *Regional Studies, Regional Science*, 5 (1), 179–182. doi:10.1080/21681376.2018.1455535

2018 Boeing, G. "Automated Street Network Analysis for Urban Planners with OSMnx." *Planning and Technology Today* 117 (Spring), 10–11. doi:10.31235/osf.io/mkbp3

2017 Boeing, G. "A Review of the Structure and Dynamics of Cities: Urban Data Analysis and Theoretical Modeling." *Journal of the American Planning Association* 83 (4), 418. doi:10.1080/01944363.2017.1362306

2017 Boeing, G. "Understanding Cities through Networks and Flows." *Berkeley Planning Journal* 28 (1), 118–123. doi:10.31235/osf.io/mxngm

2016 Boeing, G. "How Our Neighborhoods Lost Food, and How They Can Get It Back." *Progressive Planning* 206 (Winter), 35–37. doi:10.31235/osf.io/a5e2q

Reports and Working Papers

2018 Waddell, P., G. Boeing, M. Gardner, and E. Porter. "An Integrated Pipeline Architecture for Modeling Urban Land Use, Travel Demand, and Traffic Assignment." US Department of Energy SMART Mobility Urban Science Pillar: Coupling Land Use Models and Network Flow Models. Technical report. doi:10.31235/osf.io/74zaw

Patents

2014 Beck, A. E., G. Boeing, and D. Shannon. *Systems and Methods for Analyzing Requirements*. United States patent US8650186B2, European patent EP2413256, Australian patent AU2011204935, Canadian patent CA2747481, Chinese patent CN102346763.

Manuscripts in Preparation

2018 Boeing, G., M. Besbris, A. Schacter, J. Kuk. "Technology Platforms, Information Sharing, and the Shaping of Housing Markets." Target: *Planning Theory & Practice* (Interface on the sharing economy), Fall 2018.

2018 Boeing, G. "The Spatial Ordering Logic of Urban Street Patterns." Target: *International Journal of Information Management*, Winter 2019.

2018 Boeing, G., M. Besbris, A. Schachter, J. Kuk. "Housing Search in the Age of Big Data: Smarter Cities or the Same Old Blind Spots?" Target: *Housing Policy Debate* (special issue on smart cities), Spring 2019.

2018 Boeing, G. "The Design and Evolution of the Grid in U.S. Urban Street Networks." Target: *Journal of Urban Design*, Summer 2019.

2018 Boeing, G. "Off the Grid: The Evolution of American Street Network Planning." Target: *Journal of the American Planning Association*, Summer 2019.

2018 Boeing, G. "Topological Inconsistencies in Planar and Nonplanar Graphs of Urban Street Networks." Target: *Computers, Environment and Urban Systems*, Fall 2019.

2018 Boeing, G., R. Goodspeed, W. Zhang, and S. Jiang. "The Pedagogy of Urban Informatics." Target: *Journal of Planning Education and Research*, Fall 2019.

INVITED TALKS

2018 "Computational Urban Street Network Analysis." Virginia Tech, Urban Computing Seminar Series. Arlington, Virginia. Dec 4.

2018 "Urban Street Network Science with OSMnx." Tufts University, Department of Urban and Environmental Policy and Planning. Medford, Massachusetts. Nov 15.

2018 "Free Data for Free Spaces: Democratizing and Disseminating Spatial Network Data and Models for Better Urban Planning." Venice Biennale of Architecture. Venice, Italy. Oct 24.

2018 "Online Rental Housing Market Representation and the Digital Reproduction of Urban Inequality." Harvard University, Joint Center for Housing Studies. Cambridge, Massachusetts. Sep 20.

2018 "Urban Street Network Science: Modeling, Simulating, and Visualizing Complex Transportation Systems." Uber Technologies. San Francisco, California. Aug 20.

2018 "The Study of Street Networks in Urban Data Science." NYU Center for Data Science. New York, New York. Apr 18.

2018 "Computational Street Network Analysis in Urban Form Studies." Columbia University Graduate School of Architecture, Planning, and Preservation. New York, New York. Apr 17.

2018 "Scalable Methods for Acquiring, Analyzing, and Visualizing Urban Street Networks." NYU Center for Urban Science and Progress, Applied Urban Science Group. Brooklyn, New York. Apr 16.

2018 "Studying Urban Form and Resilience through Large-Scale Street Network Analysis." University of California, Santa Barbara, Department of Geography. Santa Barbara, California. Jan 30.

2018 "Seeing Cities through New Technologies and Big Data." University of Oregon, School of Planning, Public Policy, and Management. Eugene, Oregon. Jan 25.

2018 "Understanding Urban Form and Circulation through Large-Scale Street Network Analysis." Dartmouth College, Department of Geography. Hanover, New Hampshire. Jan 15.

2017 "Street Network Analyses of Urban Form Resilience and Equity." University of Chicago, Mansueto Institute for Urban Innovation. Chicago, Illinois. Nov 2.

2017 "Measuring Urban Form Sustainability with Topological and Geometric Street Network Analysis." Stanford University, Sustainable Urban Systems Initiative. Stanford, California. Oct 26.

2017 "Graph-Theoretic Representation and Analysis of Urban Street Networks." Montana State University, Department of Computer Science. Bozeman, Montana. Oct 16.

2017 "OpenStreetMap Network Data for Transportation Planning." Remix Transit Planning. San Francisco, California. Aug 16.

2017 "Street Networks: Urban Form and Resilience." University of Florida, Department of Urban and Regional Planning. Gainesville, Florida. May 8.

2017 "Scalable Methods for Acquiring, Analyzing, and Visualizing Urban Street Networks." The Santa Fe Institute. Santa Fe, New Mexico. Feb 2.

2016 "Urban Data Science for Studying Housing Affordability and Urban Form." NYU Center for Urban Science and Progress. Brooklyn, New York. Dec 14.

2016 "New Insights into Rental Housing Markets: Web Scraping and Analyzing Craigslist Rental Listings." City of Oakland. Oakland, California. May 12.

2016 "New Insights into Rental Housing Markets: Web Scraping and Analyzing Craigslist Rental Listings." City of San Francisco, Citywide Planning Division. San Francisco, California. Apr 19.

2016 "Smart Cities, Technology, and Representation: Prospects and Challenges." Adobe Systems Sustainability Speaker Series. San Jose, California. Jan 28.

Campus Talks

2018 "Urban Street Network Science with OSMnx." Northeastern University Seattle Campus. Seattle, Washington. Nov 28.

2018 "The Legibility of Urban Spatial Order in Computational Street Network Analysis." NUVis: Northeastern University Visualization Consortium. Boston, Massachusetts. Oct 18.

2017 "Urban Street Network Analysis with OSMnx." Geospatial Innovation Facility, College of Natural Resources, University of California, Berkeley. Berkeley, California. Oct 5.

CONFERENCE ACTIVITY

Plenary Addresses

2019 "Geographic Information, Spatial Networks, and the New Urban Science." American Association of Geographers Annual Meeting, *Transactions in GIS* Plenary Address. Washington, DC. Apr 3–7.

2018 "The Legible and the Illegible: Urban Science, City Design, and Human Circulation." The Architect of the Future Conference. Moscow, Russia. Sep 10–11.

Sessions Organized

2017 "Emerging Computational Methods in Urban Design." Association of Collegiate Schools of Planning Annual Conference. Denver, Colorado. Oct 12–15.

Panels Moderated

2018 "Smart Cities Technologies for Transportation Systems." Smart Cities Critical Infrastructure Protection Conference. Seattle, Washington. Nov 29.

Invited Panelist

2019 "Urban Data Science: Methods & Models for Our Changing Cities." Panelist with Taylor Oshan, Levi Wolf, and Wei Kang. American Association of Geographers Annual Meeting. Washington, DC. Apr 3–7.

2018 "Who Benefits from 'Smart City' Technologies? How Can They Be a Piece of the Puzzle Toward Social and Environmental Justice?" Panelist with Lisa Schweitzer, Clint Andrews, and Tom Sanchez; chaired by Mehdi Heris. Association of Collegiate Schools of Planning Annual Conference. Buffalo, New York. Oct 25–28.

2017 "Public Communication Strategies for Planning Academics." Panelist with Jennifer Dill, Yingling Fan, and Justin Hollander; chaired by Carissa Slotterback. Association of Collegiate Schools of Planning Annual Conference. Denver, Colorado. Oct 12–15.

Conference Respondent

2018 Big Ideas Session on Civic Analytics and Urban Science with Luis Bettencourt, Marta González, and Sarah Williams. Association of Collegiate Schools of Planning Annual Conference. Buffalo, New York. Oct 25–28.

Conference Presentations

Presenting author *italicized*, if other.

2019 Boeing, G. "The Evolution of American Street Network Design and Planning." Urban Affairs Association Annual Conference. Los Angeles, California. Apr 24–27.

2019 Boeing, G. "The Design and Evolution of the Grid in U.S. Urban Street Networks." American Association of Geographers Annual Meeting. Washington, DC. Apr 3–7.

2019 Abdelkader, A., G. Boeing, *B. T. Fasy*, D. L. Millman. "Topological Distance Between Nonplanar Transportation Networks." Joint Mathematics Meetings. Baltimore, Maryland. Jan 16–19.

2019 Boeing, G. "Street Network Patterns, Orientation, and Entropy around the World." Transportation Research Board Annual Meeting. Washington, DC. Jan 13–17.

2019 Boeing, G. "Street Network Patterns, Orientation, and Entropy around the World." International Conference on Network Science (NetSci-X). Santiago, Chile. Jan 3–5.

2018 *Abdelkader, A.*, G. Boeing, B. T. Fasy, D. L. Millman. "Topological Distance Between Nonplanar Transportation Networks." Fall Workshop on Computational Geometry. Queens, New York. Oct 26–27.

2018 Boeing, G. "Sociodemographic Representation of Online Rental Housing Listings: Information Surpluses and Deficits." Association of Collegiate Schools of Planning Annual Conference. Buffalo, New York. Oct 25–28.

2018 *Waddell, P.*, I. Garcia-Dorado, S. Maurer, G. Boeing, M. Gardner, E. Porter, D. Aliaga. "Urban Modeling Without Zones: A Metropolitan Graph-Based Microsimulation of Real Estate Markets and Transportation." Association of Collegiate Schools of Planning Annual Conference. Buffalo, New York. Oct 25–28.

2018 Boeing, G. "Transportation Network Modeling and Urban Equity." Dukakis Center for Urban and Regional Policy Transportation Equity Conference. Boston, Massachusetts. Oct 19.

2018 *Waddell, P.*, I. Garcia-Dorado, S. Maurer, G. Boeing, M. Gardner, E. Porter, D. Aliaga. "Architecture for Modular Microsimulation of Real Estate Markets and Transportation." Symposium on Applied Urban Modelling. Cambridge, England. Jun 27–29.

2017 Boeing, G. "New Methods for Acquiring and Analyzing Worldwide Street Network Data: A Multiscale Analysis of 27,000 Urban Street Networks." Association of Collegiate Schools of Planning Annual Conference. Denver, Colorado. Oct 12–15.

2016 Boeing, G. "Craigslist and U.S. Rental Housing Markets." American Planning Association Annual Conference. Phoenix, Arizona. Apr 2–5.

2016 Boeing, G. "Understanding Informal Rental Housing Markets through Public Data." American Association of Geographers. San Francisco, California. Mar 29–Apr 2.

2016 Barajas, J. M., G. Boeing, and *J. Wartell*. "Neighborhood Change, One Pint at a Time: The Impact of Local Characteristics on Craft Breweries." Urban Affairs Association Annual Conference. San Diego, California. Mar 16–19.

2015 Boeing, G. "Methods for Measuring the Aggregate Complexity Outcomes of Urban Design." International Conference on Complex Systems. Tempe, Arizona. Sep 28–Oct 2.

2015 Boeing, G. "Pedagogy of Urban Informatics." Environmental Design Circus. Berkeley, California. Mar 6.

2014 Boeing, G. and P. Waddell. "Web Scraping Urban Data: Lessons from the Lab and the Classroom." Association of Collegiate Schools of Planning Annual Conference. Philadelphia, Pennsylvania. Oct 30–Nov 2.

2014 Boeing, G., D. Church, H. Hubbard, J. Mickens, and L. Rudis. "LEED-ND and Perceptions of Livability." Environmental Design Circus. Berkeley, California. Mar 13.

GRANTS, FELLOWSHIPS, AWARDS

2018 The Public Good Projects research grant ($200,000/2 years *details being finalized*). Role: PI.

2018 NULab for Maps, Texts, and Networks travel grant ($1,000)

2018 ACSP FWIG Emerging Scholar travel grant ($500)

2018 Northeastern University start-up research fund ($25,000/3 years)

2017 University of California Doctoral Completion Fellowship ($36,655)

2016 UC Berkeley DCRP travel grant ($500)

2016 University of California Graduate Division travel grant ($900)

2015 UC Berkeley DCRP travel grant ($500)

2014 Kaye Bock Award for best journal article ($250)

2012 University of California Regents' Fellowship ($158,025/4 years)

2010 Accenture Inventor Innovation Award ($2,500)

TEACHING EXPERIENCE

Northeastern University

Big Data for Cities (Spring '19)

Advanced Spatial Analysis of Urban Systems (Spring '19)

Urban Theory and Science (Fall '18)

University of California, Berkeley

Urban Informatics and Visualization (Fall '13, '14, '15, '16: grad student instructor, co-lead instructor)

Planetizen

Python for Planners; Data Analysis and Visualization for Planners; Geospatial Data Analysis; Street Network Analysis

SERVICE

Peer Reviewer

Journal of the American Planning Association

Environment and Planning B: Urban Analytics and City Science

Journal of Transport and Land Use

Cities

Landscape and Urban Planning

International Journal of Geographical Information Science

Urban Design International

International Planning Studies

International Regional Science Review

PLOS One

The European Physical Journal: Data Science

International Journal of Geoinformation

Nonlinear Dynamics

Service to Field

Review and Appraisal Committee, Association of Collegiate Schools of Planning, 2018–

Scientific Committee, Symposium on Simulation for Architecture and Urban Design, 2018–

Book review editor, *Berkeley Planning Journal*, 2013–14

Service to Department

Ph.D. program faculty representative, UC Berkeley DCRP, 2015–16

Ph.D. program admissions committee, UC Berkeley DCRP, 2015–16

PROFESSIONAL AFFILIATIONS

American Planning Association
Association of Collegiate Schools of Planning
American Association of Geographers
Regional Studies Association
Complex Systems Society
New York Academy of Sciences
Python Software Foundation
Association for Computing Machinery
Project Management Institute

CREDENTIALS

U.S. Department of Defense secret clearance
U.S. Department of Homeland Security public trust
Project Management Professional (PMP)

CONSULTING ENGAGEMENTS

2017– The Public Good Projects
2017–18 Calthorpe Analytics
2016–18 UrbanSim Inc.
2013– Avalon Health Economics
2013 Raimi & Associates
2009–13 Accenture

PROFESSIONAL EXPERIENCE

2009–13 Accenture, Consultant/Project Manager. London, England; New York, New York; San Diego, California.
2007–09 Permission Data, Front-End Systems Product Manager. New York, New York.
2004–07 Acumen Inc., Web Systems Developer. Mesa, Arizona.

SELECTED MEDIA COVERAGE

Complete listing available at https://geoffboeing.com/press/

2018 *CityLab*. "Visualizing the Hidden Logic of Cities" Jul 26.

2018 *New Statesman CityMetric*. "Do British Cities Have Grid Systems? We Used Science to Find Out." Jul 23.

2018 *99 Percent Invisible*. "On the Grid: Visualizing Street Network Orientations Across 50 Global Cities." Jul 20.

2018 *Fast Company*. "How Crazy Is Your City's Plan?" Jul 16.

2018 *The Boston Globe*. "Boston's Streets Do Go in All Sorts of Directions." Jul 12.

2018 *Slate*. "Elegant Graphs Reduce 25 American Cities to Their Design Essence." Jul 11.

2018 *Chicago Magazine*. "What Craigslist Can Tell Us About Rents in Chicago." Jan 24.

2017 *The San Francisco Chronicle*. "Stunning, Simple Maps Show San Francisco versus Other Global Cities." Jun 19.

2017 *The Daily Mail*. "Square Mile Maps Reveal How Different the World's Cities Really Are." Jun 9.

2017 *Forbes*. "Understanding Our Cities, Thanks to Beautiful Maps." Feb 7.

2017 *Fast Company*. "Turn Your Local Streets into a Map That Reveals the Character of Your Neighborhood." Feb 6.

2017 *Domus Magazine*. "Do-It-Yourself City Mapping." Jan 23.

2017 *CityLab*. "A Digital Window into Your City's Urban Form." Jan 17.

2017 *Discovery News*. "Compare City Street Grids One Square Mile at a Time." Jan 9.

2016 *The Washington Post*. "What More Than 1 Million Craigslist Rental Listings Tell Us about the Housing Market." Sep 1.

2016 *Fast Company*. "11 Million Craigslist Ads Show Which Cities Have the Highest Rents." Sep 1.

2016 *NextCity*. "What 11 Million Craigslist Posts Show About Affordable Housing." Aug 26.

SKILLS AND METHODS

Statistical and Computational Methods

Computational statistics and machine learning, systems analysis, data mining, data wrangling, Python (including numpy, scipy, pandas, matplotlib, statsmodels, networkx, and scikit-learn), JavaScript, HTML, web scraping, MySQL, Postgres, and various other databases.

Geospatial Methods

Spatial analysis, network analysis, PostGIS, QGIS, ArcGIS, geopandas, Leaflet, CARTO, agent-based spatial modeling and microsimulation. I developed and maintain the OSMnx street network modeling software.

International Experience

I have previously worked professionally in the United States, the United Kingdom, Malawi, Mozambique, and Cambodia.

Updated November 2018