

# Michael Szell

## Associate Professor

NEtworks, Data, and Society (NERDS)  
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## Positions held

Associate professor, Computer Science Department, IT University of Copenhagen, since Oct 2020  
Affiliate, Pioneer Centre for Artificial Intelligence, since Feb 2023  
External researcher, ISI Foundation, since Nov 2021  
External faculty, Complexity Science Hub Vienna, since Apr 2017  
Founder and manager of Bayer & Szell OG, since Sep 2006

## *Past positions*

Assistant professor, Computer Science Department, IT University of Copenhagen  
Feb 2019 – Sep 2020  
External researcher, ISI Foundation  
Aug 2019 – Jul 2020  
Assistant professor, Department of Network and Data Science, Central European University  
Oct 2017 – Jan 2019  
Researcher, Centre for Economic and Regional Studies, Hungarian Academy of Sciences  
Sep 2017 – Jan 2019  
Adjunct visiting professor, Center for Complex Network Research, Northeastern University  
Sep 2016 – Jan 2019  
Research fellow, Centre for Social Sciences, Hungarian Academy of Sciences  
Sep 2016 – Sep 2017  
Researcher in residence, moovel lab, moovel Group GmbH  
Sep 2016 – Dec 2016  
Postdoctoral research associate, Center for Complex Network Research, Northeastern University  
Jul 2014 – Sep 2016  
Postdoctoral research fellow, Senseable City Laboratory, Massachusetts Institute of Technology  
Apr 2012 – Jul 2014  
Research assistant, Section for Science of Complex Systems, Medical University of Vienna  
Jan 2009 – Dec 2011

## Research interests

Primary: Urban/Geospatial data science, Human mobility, Sustainable transport  
Secondary: Network science, Complex systems, Social networks, Data visualization

## Education

Ph.D. in Physics, summa cum laude, University of Vienna, Mar 2012

M.Sc. in Technical Mathematics, Vienna University of Technology, Oct 2007

## Skills

Programming: Python, MATLAB, PHP, SQL, HTML/CSS

Data mining, Databases, Web scraping, Online game development

Languages: *Native* – German, Hungarian, *Proficient* – English, *Intermediate* – Italian, Danish

## Publications

### *Preprints*

A. Lonardi, M. Szell, C. De Bacco

**Cohesive urban bicycle infrastructure design through optimal transport routing in multilayer networks**, *arXiv:2405.02052*, (2024)

H. Wolf, A.R. Vierø, M. Szell

**CoolWalks: Assessing the potential of shaded routing for active mobility in urban street networks**, *arXiv:2405.01225*, (2024)

L.M. Aiello, A. Vybornova, S. Juhász, M. Szell, E. Bokányi

**Urban highways are barriers to social ties**, *arXiv:2404.11596*, (2024)

M. Coscia, C. Borgelt, M. Szell

**Fast Multiplex Graph Association Rules for Link Prediction**, *arXiv:2211.12094* (2022)

### *Peer-reviewed publications*

C.M. Büth, A. Vybornova, M. Szell

**superblockify: A Python Package for Automated Generation, Visualization, and Analysis of Potential Superblocks in Cities**, *Journal of Open Source Software* 9(100), 6798 (2024)

A. Rahbek Vierø, A. Vybornova, M. Szell

**How Good Is Open Bicycle Network Data? A Countrywide Case Study of Denmark**, *Geographical Analysis* (2024, in print)

D. Rhoads, C. Rames, A. Solé-Ribalta, M.C. González, M. Szell, J. Borge-Holthoefer

**Sidewalk networks: Review and outlook**, *Computers, Environment and Urban Systems* 106, 102031 (2023)

A. Rahbek Vierø, A. Vybornova, M. Szell

**BikeDNA: A Tool for Bicycle Infrastructure Data & Network Assessment**, *Environment and Planning B* 51(2), 512–528 (2024)

A. Battiston, L. Napoli, P. Bajardi, A. Panisson, A. Perotti, M. Szell, R. Schifanella

**Revealing the determinants of gender inequality in urban cycling with large-scale data**, *EPJ Data Science* 12, 9 (2023)

S.M. Breum, B. Kostic, M. Szell

**Computational Desire Line Analysis of Cyclists on the Dybbølsbro Intersection in Copenhagen**, *Transport Findings* 56683 (2022)

P. Folco, L. Gauvin, M. Tizzoni, M. Szell

**Data-driven bicycle network planning for demand and safety**, *Environment and Planning B* 50(8), 2087–2102 (2023)

L. Alessandretti, L.G. Natera Oroczco, M. Saberi, M. Szell, F. Battiston

**Multimodal urban mobility and multilayer transport networks**, *Environment and Planning B* 50(8), 2038–2070 (2023)

M. Klanjčić, L. Gauvin, M. Tizzoni, M. Szell

**Identifying urban features for vulnerable road user safety in Europe**, *EPJ Data Science* 11, 27 (2022)

M. Szell, S. Mimar, T. Perlman, G. Ghoshal, R. Sinatra

**Growing urban bicycle networks**, *Scientific Reports* 12, 6765 (2022)

A. Vybornova, T. Cunha, A. Gühnemann, M. Szell

**Automated Detection of Missing Links in Bicycle Networks**, *Geographical Analysis* 55(2), 239–267 (2023)

M. Coscia, M. Szell

**Multiplex Graph Association Rules for Link Prediction**, *Proceedings of the International Conference on Web and Social Media (ICWSM)* 15(1), 129–139 (2021)

M. Schlöpfer, L. Dong, K. O’Keeffe, P. Santi, M. Szell, H. Salat, S. Anklesaria, M. Vazifteh, C. Ratti, G.B. West

**The universal visitation law of human mobility**, *Nature* 593(7860), 522–527 (2021)

L.G. Natera Orozco, F. Battiston, G. Iñiguez, M. Szell

**Data-driven strategies for optimal bicycle network growth**, *Royal Society Open Science* 7:201130 (2020)

L.G. Natera Orozco, F. Battiston, G. Iñiguez, M. Szell

**Extracting the multimodal fingerprint of urban transportation networks**, *Transport Findings* 13171 (2020)

F. Battiston, F. Musciotto, D. Wang, A.-L. Barabási, M. Szell, R. Sinatra

**Taking census of physics**, *Nature Reviews Physics* 1, 89–97 (2019)

M. Szell, Y. Ma, R. Sinatra

**A Nobel opportunity for interdisciplinarity**, *Nature Physics* 14, 1075–1078 (2018)

M. Szell

**Crowdsourced quantification and visualization of urban mobility space inequality**, *Urban Planning* 3, 1–20 (2018)

S. Grauwin, M. Szell, S. Sobolevsky, P. Hövel, F. Simini, M. Vanhoof, Z. Smoreda, A.-L. Barabási, C. Ratti

**Identifying the structural discontinuities of human interactions**, *Scientific Reports* 7, 46677 (2017)

R. Tachet, O. Sagarra, P. Santi, G. Resta, M. Szell, S. Strogatz, C. Ratti

**Scaling law of urban ride sharing**, *Scientific Reports* 7, 42868 (2017)

M. Nyhan, S. Sobolevsky, C. Kang, P. Robinson, A. Corti, M. Szell, D. Streets, Z. Lu, R. Britter, S.R.H. Barrett, C. Ratti

**Predicting vehicular emissions in high spatial resolution using pervasively measured transportation data and microscopic emissions model**, *Atmospheric Environment* 140, 352–363 (2016)

R. Sinatra, P. Deville, M. Szell, D. Wang, A.-L. Barabási

**A century of physics**, *Nature Physics* 11, 791–796 (2015)

O. Sagarra, M. Szell, P. Santi, A. Diaz-Guilera, C. Ratti

**Supersampling and network reconstruction of urban mobility**, *PLOS ONE* 10(8), e0134508 (2015)

O. Mryglod, B. Fuchs, M. Szell, Y. Holovatch, S. Thurner

**Interevent time distributions of human multi-level activity in a virtual world**, *Physica A* 419, 681–690 (2014)

P. Santi, G. Resta, M. Szell, S. Sobolevsky, S. Strogatz, C. Ratti

**Quantifying the benefits of vehicle pooling with shareability networks**, *Proceedings of the National Academy of Sciences* 110(37), 13290–13294 (2014)

M. Szell, S. Grauwin, C. Ratti

**Contraction of online response to major events**, *PLOS ONE* 9(2), e89052, (2014)

R. Sinatra, M. Szell

**Entropy and the predictability of online life**, *Entropy* 16(1), 543–556 (2014)

S. Sobolevsky, M. Szell, R. Campari, T. Couronné, Z. Smoreda, C. Ratti

**Delineating geographical regions with networks of human interactions in an extensive set of countries**, *PLOS ONE* 8(12), e81707 (2013)

S. Thurner, P. Klimek, M. Szell, G. Duftschmid, G. Endel, A. Kautzky-Willer, D. Kasper

**Quantification of excess-risk for diabetes when born in times of hunger, in an entire population of a nation, across a century**, *Proceedings of the National Academy of Sciences* 110, 4703–4707 (2013)

M. Szell, S. Thurner

**How women organize social networks different than men**, *Scientific Reports* 3, 1214 (2013)

M. Szell, R. Sinatra, G. Petri, S. Thurner, V. Latora

**Understanding mobility in a social petri dish**, *Scientific Reports* 2, 457 (2012)

M. Szell, S. Thurner\*

**Social dynamics in a large-scale online game**, *Advances in Complex Systems* 15, 1250064 (2012)

S. Thurner, M. Szell, R. Sinatra

**Emergence of good conduct, scaling and Zipf laws in human behavioral sequences in an online world**, *PLOS ONE* 7, e29796 (2012)

M. Szell, S. Thurner

**Measuring social dynamics in a massive multiplayer online game**, *Social Networks* 32, 313–329 (2010)

M. Szell, R. Lambiotte, S. Thurner

**Multirelational organization of large-scale social networks in an online world**, *Proceedings of the National Academy of Sciences* 107, 13636–13641 (2010)

### Other academic publications

M. Szell, Y. Ma, R. Sinatra

**Was the Nobel prize for physics? Yes – not that it matters**, *Nature* 634, 782 (2024)

L. Alessandretti, M. Szell

**Urban Mobility**, in: *Compendium of Urban Complexity*, (2024, accepted)

B. Resch, M. Szell

**Human-Centric Data Science for Urban Studies**, *ISPRS International Journal of Geo-Information* 8, 584 (2019)

Y. Holovatch, O. Mryglod, M. Szell, S. Thurner

**Analyses of a virtual world**, In: *Math Meets Myth: Complexity-science approaches to folktales, myths, sagas, and histories*, Springer, Eds.: R. Kenna, M. Maccarron, P. Maccarron (2017)

M. Szell, R. Sinatra

**Research funding goes to rich clubs**, *Proceedings of the National Academy of Sciences* 112(48), 14749–14750 (2015)

M. Szell, P. Santi, C. Ratti

**Trip sharing in the era of self-driving cars**, *Autonomous Vehicles Conference*, New York University (2015)

P. Santi, G. Resta, M. Szell, S. Sobolevsky, S. Strogatz, C. Ratti

**Reply to Lopez et al.: Sustainable implementation of taxi sharing requires understanding systemic effects**, *Proceedings of the National Academy of Sciences* 111(51), E5489 (2014)

M. Szell, B. Groß

**Hubcab – Exploring the Benefits of Shared Taxi Services**, in: *Decoding the City*, De Gruyter, Eds.: D. Offenhuber, C. Ratti (2014)

M. Szell

**Connecting Paradigms**, *Science* 343(6147), 970–971 (2014)

M. Szell, B. Groß

**Hubcab – Taxi-Fahrgemeinschaften, digital erkundet**, *Stadt entschlüsseln*, Bauwelt Fundamente 150, Birkhäuser, Eds.: D. Offenhuber, C. Ratti (2013)

S. Thurner, P. Klimek, M. Szell, G. Duftschmid, G. Endel, A. Kautzky-Willer, D. Kasper

**Reply to Klitz and Niklasson: Can viral infections explain the cross-sectional Austrian diabetes data?**, *Proceedings of the National Academy of Sciences* 110, E2751 (2013)

M. Szell

**Statistical physics approaches to large-scale socio-economic networks**, *Dissertation*, University of Vienna (2011)

S. Thurner, M. Szell (Eds.)

**Book of abstracts ECCS'11 Vienna**, *European Conference on Complex Systems 2011*, Löcker (2011)

M. Szell, G. Petri, K. Zhao, D. Levin

**Human mobility in an online world**, *Santa Fe Summer School 2010 Project Paper* (2010)

M. Szell

**Finite Differenzen Verfahren zur numerischen Lawinensimulation**, *Diploma thesis*, Vienna University of Technology (2007)

M. Szell, F. Judex

**Petri Net Modelling of Different Strategies in ARGESIM Comparison C4 “Dining Philosophers” with HPSim**, *Simulation News Europe* 17, 1 (2007)

## Other non-academic publications

A.F. Valderrama Pineda, A. Fjendbo Jensen, C. Samson, H. Lahrmann, H. Rømmer Kristensen, J. Schipperijn, M. Paulsen, M. Freudendal-Pedersen, M. Szell, M. Hvidt Breengaard  
**Er Danmark en cykelnation?**, *Politiken* (2022)

M. Szell

**Identifying urban features for vulnerable road user safety in Europe**, *BMC Blog Network* (2022)

O. Anker, S. Haustein, K. Hyldekær Janstrup, A. Fjendbo Jensen, M. Møller, J. Rich, M. Freudendal-Pedersen, O.B. Jensen, H. Lahrmann, A. Valderrama, M. Szell, H. Skov-Petersen, J. Troelsen, J. Schipperijn  
**14 forskere: Videnscenter for cyklisme skal ikke høre under Vejdirektoratet**, *Altinget* (2021)

M. Szell

**Bæredygtige byer kræver målrettet investering i cykelinfrastruktur**, *Ingeniøren / Mobilitytech* (2021)

M. Szell, J. Kickbusch

**Brug ny mobilitetslov til at skabe et mere bæredygtigt byliv**, *FINANS* (2021)

P. Heigren, M. Winding, M. Szell

**Cykling i byen: Små investeringer i infrastruktur binder din by sammen**, *Ingeniøren / Mobilitytech* (2021)

## Data visualization projects

**superblockify**, Apr 2024, [superblockify.city](https://superblockify.city)

superblockify is a Python package for partitioning an urban street network into Superblock-like neighborhoods and for visualizing and analyzing the partition results.

**GrowBike.Net**, Jul 2021, [growbike.net](https://growbike.net)

An interactive visualization platform growing cohesive urban bicycle networks - something that every modern city should have. Studying these synthetic networks informs us about the geometric limitations of urban bicycle network growth and can lead to better designed bicycle infrastructure in cities.

**Taxonomy of Urban Bicycle Network Approaches**, Jan 2021, [github.com/mszell/taxonomybikenw](https://github.com/mszell/taxonomybikenw)

The idea of this visualization is to identify the most distinct environments for cycling arriving from different approaches of urban planning.

**Stephen Hawking Career**, March 2018, [michael.szell.net/hawking](https://michael.szell.net/hawking)

A Science of Science tribute to Stephen Hawking. This interactive plot allows the exploration of the influential physicist's oeuvre – scientific papers and books – and its impact.

**What the Street!?**, June 2017, [whatthestreet.com](https://whatthestreet.com)

An online platform for intuitive and playful exploration of wasted mobility space in cities, of uneven distribution of space between different modes of transportation, and how massive areas of car parking could be regained for the public.

**HubCab**, Mar 2014, [www.hubcab.org](https://www.hubcab.org)

An interactive visualization that invites you to explore the ways in which over 170 million taxi trips connect the City of New York in a given year. This interface provides a unique insight into the inner workings of the city from the previously invisible perspective of the taxi system with a never before seen granularity.

**Tweet Bursts**, Feb 2014, [senseable.mit.edu/tweetbursts](https://senseable.mit.edu/tweetbursts)

Visual exploration of our collective excitement towards major events: The more excited we are, and the more intense the flurry of messages in the collective, the shorter our messages become.

## Talks

### *Keynotes and invited talks*

*DataBeers Copenhagen*, Copenhagen, Denmark, Sep 2023  
Stories from 1001 paths (over Dybbølsbro)

*Büro Happold*, Copenhagen, Denmark, Jul 2023  
Urban Data and Network Science for More Cycling and Walking in Cities

*Eurosolar Austria*, Vienna, Austria, Apr 2023  
Wie man optimale Radweg-Netze für Städte plant

Complexity Science Hub Vienna, Austria, Apr 2023  
Bicycle infrastructure data and networks: Opportunities and limitations

*CASA Seminar*, London, UK (remotely), Dec 2022  
Bicycle networks: From data quality assessment to computational analysis

ITU, Launch of Center for Climate IT, Copenhagen, Denmark, Dec 2022  
Sustainable mobility and data-driven planning

Copenhagen Municipality, Copenhagen, Denmark, Nov 2022  
Computational desire line analysis of cyclists on the Dybbølsbro intersection

Geographic data science lab: *Brown bag seminar*, Liverpool, UK, Sep 2022  
Data-informed bicycle network planning: processes and criticisms

Keynote talk at *UA 2.0 – Towards greener and sustainable cities*, Exeter, UK, Jun 2022  
Establishing a quantitative science of bicycle networks

*ISI Foundation* workshop, Turin, Italy, May 2022  
Cycling research at NERDS

*Physics and Collective Dynamics of Future Mobility* workshop at Max Planck Institute, Dresden, Germany (remotely), Mar 2022  
Towards a human-centric urban data science

*General Assembly* of the Cycling Embassy of Denmark, Copenhagen, Denmark, Mar 2022  
Netværksanalyse af den danske cykelinfrastruktur

Copenhagen Municipality, Copenhagen, Denmark, Dec 2021  
Finding the missing links in the Copenhagen bike network

*Supercykelstier* Frokostmøde, Copenhagen, Denmark, Dec 2021  
Netværksanalyse af den danske cykelinfrastruktur

*Urban Complex Systems* satellite of CCS 2021 conference, Lyon, France (remotely), Oct 2021  
Making cities better with human-centric urban data science

*City Interaction Lab*, Paris, France (remotely), May 2021  
Vulnerable road user safety in Europe, and towards a science of bicycle network design

*Supercykelstier*, Copenhagen, Denmark (remotely), Mar 2021  
Data-driven strategies for optimal bicycle network growth

*MIT Medial Lab*, Cambridge, USA (remotely), Sep 2020  
Human-centric Urban Data Science with OpenStreetMap

EFC Funders Forum on Sustainable Cities, Turin, Italy, Oct 2019  
Revealing wasted urban space with crowd-sourced data

*Complex networks* workshop, Lipari, Italy, Jul 2019  
 Taking census of Physics and of the Nobel Prize  
*DataBeers Copenhagen*, Denmark, May 2019  
 Understanding wasted mobility space with crowdsourced urban data  
 Keynote talk at *Parallel Cities Science Forum* at *BLOXHUB*, Copenhagen, Denmark, Mar 2019  
 Measuring Mobility Space Inequality  
*Mathematical modelling* seminar, Budapest, Hungary, Sep 2018  
 Mathematical modelling of human mobility  
*Complex networks* workshop, Lipari, Italy, Jul 2018  
 Quantitative analysis of urban shareability networks and mobility spaces  
*Big Dive* at *ISI Foundation*, Turin, Italy, Jul 2018  
 Urban data science towards sustainable cities: From taxi sharing to mobility space equality  
 External Faculty Meetup at *Complexity Science Hub*, Vienna, Austria, May 2018  
 Make cities great again: Understand urban complexity, but embrace simplicity  
*Urban Mobility* OpenStreetMap Hungary Meetup, Budapest, Hungary, May 2018  
 Using OpenStreetMap for Quantification and Visualization of Urban Mobility Space Inequality  
 Keynote talk at *Innovation & Cooperation* event of Wiener Stadtwerke at *TU Wien*, Vienna, Austria, Apr 2018  
 Urban Data Culture – Notwendigkeit und Chancen datenbasierter, interdisziplinärer Stadtentwicklung  
*AI and Urban Life* satellite at *NetSci-X 2018*, Hangzhou, China, Jan 2018  
 Exploring New York City Taxi Trails and Sharing Our Way to a More Sustainable Urban Future  
 Invited talk at *Hungarian Academy of Sciences*, Budapest, Hungary, Nov 2017  
 Exploring quantitatively sharing benefits and inequalities in urban transportation  
 Workshop on Complex Systems at *Complexity Science Hub Vienna*, Vienna, Austria, Oct 2017  
 Towards a quantitative understanding of cities using network science and large-scale data analysis  
 Keynote talk at *COSTNET2017 Conference*, Palma de Mallorca, Spain, Oct 2017  
 Unveiling untapped potential in cities: From taxi sharing to mobility space inequality  
*Harvard University*, Cambridge, USA, Jul 2017  
 Visual exploration of urban mobility space inequality with What the Street!?  
*Northwestern University*, Evanston, USA, Jul 2017  
 Quantifying sharing benefits and injustice in urban transportation  
*Senseable City Lab*, MIT, Cambridge, USA, Jun 2017  
 Exploring the arrogance of space with What the Street!?  
*Quantifying success* satellite at *NetSci 2017*, Indianapolis, USA, Jun 2017  
 The success of teams and interdisciplinary research  
 Talk at Center for Network Science, Central European University, Budapest, Hungary, May 2017  
 Understanding social networks and collective behavior in online and urban environments  
*Physics of Flexible Mobility* symposium at *DPG Spring Meeting*, Dresden, Germany, Mar 2017  
 Mobility in shareability networks  
*moovel meetup* at *moovel Group GmbH*, Stuttgart, Germany, Sep 2016  
 The science of trip-sharing  
 Seminar at “Lendület” Research Center for Educational and Network Studies (RECENS), Budapest, Hungary, Jan 2016  
 Conflict and cooperation in large social networks  
*Autonomous Vehicles* Conference at New York University, New York, USA, May 2015  
 Trip-sharing in the age of self-driving cars



*Understanding Complexity* Conference, Vienna, Austria, Feb 2015  
 Understanding Human Society with a Social Petri Dish

*Zurich meets New York* Festival at New York Academy of Science, New York, USA, May 2014  
 Using virtual worlds to explore behavior of people

*Social Network Analysis* Colloquium at ETH Zürich, Switzerland, Feb 2014  
 The Social Petri Dish and New Perspectives in Social Network Analysis

*Urban Beers* Meetup, Barcelona, Spain, Sep 2013  
 Taxi pooling in New York City: a network-based approach to optimize shared mobility

*FuturICT Workshop* at MIT Media Lab, Cambridge, Feb 2013  
 Online games as platforms for measuring socio-economic behavior

*Macro Connections* Seminar at Harvard University, Cambridge, USA, Oct 2011  
 Understanding collective socio-economic behavior in an online world

Talk at Barabasilab, Northeastern University, Boston, USA, Oct 2011  
 Structure and dynamics of multi-relational, socio-economic networks in an online world

*Games Technology Workshop* at ETH Zürich, Switzerland, Mar 2011  
 Browser-based MMOGs: Technology and use as research tools

Interdisciplinary Seminar *Modeling Complex Socio-Economic Systems and Crises* at ETH Zürich, Switzerland, Feb 2011  
 Social Networks in Multiplayer Online Games

Invited talk at ETH Zürich, Switzerland, Feb 2011  
 Massive Multiplayer Online Games as Socio-economic Labs

*IIASA Xevents Workshop*, Laxenburg, Austria, Mar 2010  
 Extreme events in a large-scale, virtual human society

Invited talk at University of Catania, Italy, Oct 2009  
 Measuring the evolution of socio-economical structure in an online game

Invited lecture at the Department of Education and Human Development, University of Vienna, Austria, Jun 2008  
 Pardus – Funktion und Aufbau eines Browser-Spiels

*ARGESIM Simulation Workshop*, Siena, Italy, Sep 2007  
 Finite Differenzen Verfahren zur numerischen Lawinensimulation  
 Pardus – Funktion und Aufbau eines Browser-Spiels

*Workshop for avalanche dynamics* at the Austrian service for Torrent and Avalanche Control, Schwaz, Austria, Oct 2007  
 Finite Differenzen Verfahren zur numerischen Lawinensimulation

### *Contributed talks*

*IC2S2 2023* Conference, Copenhagen, Denmark, Jul 2023  
 Computational Desire Line Analysis of Cyclists on the Dybbølsbro Intersection in Copenhagen

*CSH-ITU workshop Sustainable Mobility: Data, Networks, and Complexity*, Vienna, Austria, Apr 2023  
 The Science of Growing Urban Bicycle Networks

*UrbanSys2021* satellite at *CCS 2021*, Lyon, France, Oct 2021  
 Growing cohesive urban bicycle networks

5th Annual Meeting of the Cycling Research Board, *CRBAM21*, Copenhagen, Denmark, Oct 2021  
 The geometric limits of growing urban bicycle networks

1st Annual Meeting of the Cycling Research Board, Amsterdam, Netherlands, Nov 2018  
 Cross-city visualization & quantification of the “arrogance of space” using large-scale transport space data

*NetSci 2018* Conference, Paris, France, Jun 2018  
 Structural discontinuities of human interactions in space

*Urban Systems and Network Science* satellite at *NetSci 2017*, Indianapolis, USA, Jun 2017  
 Interactive, animated exploration of urban mobility spaces through the online platform “What the Street!?”

*CompleNet 2017* Conference, Dubrovnik, Croatia, Mar 2017  
 Shareability networks: Quantifying ride-sharing benefits

*IC2S2 2016* Conference, Evanston, USA, Jun 2016  
 Exploring the anatomy of physics

*CompleNet 2016* Conference, Dijon, France, Mar 2016  
 Quantifying social effects in collaborative work

*ICCSS 2015* Conference, Helsinki, Finland, Jun 2015  
 Understanding effort and success in teams

*NetSci 2015* Conference, Zaragoza, Spain, Jun 2015  
 Quantifying team effort and success

*CompleNet 2015* Conference, New York City, USA, Mar 2015  
 Understanding Team Success

*NetSci 2014* Conference, Berkeley, USA, Jun 2014  
 Higher-order models in human mobility and interactions

*Network Frontier Workshop 2013* at Northwestern University, Evanston, USA, Dec 2013  
 Taxi-pooling in New York City: A network-based approach to social sharing

*Engaging Data 2013* Conference at MIT, Cambridge, USA, Nov 2013  
 Hubcab – Taxi-sharing in New York City: A network-based approach

*ECCS 2013* Conference, Barcelona, Spain, Sep 2013  
 Human spatial organization and the emergence of urban centers

*ECCS 2013* Conference, Multiplex Networks 2013, Barcelona, Spain, Sep 2013  
 Multiplex networks in social systems

*Urban Code* Conference, Cambridge, USA, Nov 2012  
 hubcab – A network-based improved urban taxi service

Ph.D. Defensio at University of Vienna, Austria, Mar 2012  
 Statistical physics approaches to large-scale socio-economic networks

*ECCS 2011* Conference, Vienna, Austria, Sep 2011  
 Human mobility on a network

*NetSci 2011* Conference, Budapest, Hungary, Jun 2011  
 Multi-relational Socio-economic Networks in a Large-scale Online Community

*Net2011* Conference at University Bicocca Milano, Italy, May 2011  
 Multi-relational socio-economic networks in a massive multiplayer online game

*INSITE Kickoff-Meeting*, Venice, Italy, Apr 2011  
 The artificial world of the Pardus game: First lessons

*7th Vienna Central European Seminar in Particle Physics and Quantum Field Theory*, Austria, Nov 2010  
 Complex human mobility dynamics on a network

*ECCS 2010* Conference, Lisbon, Portugal, Sep 2010  
 Multi-relational social dynamics in a large-scale online game society  
 Trade, Conflict and Sentiments: Multi-relational organization of large-scale social networks

COST workshop *Processes on Networks* at Medical University of Vienna, Austria, Mar 2010  
 Establishment of a large-scale “laboratory” for socio-economic behavior

Workshop *Modelling Science* at Rathenau Institute, Amsterdam, Netherlands, Oct 2009  
 Measuring the evolution of socio-economical structure in an online game

DPG Spring Meeting, Dresden, Germany, Mar 2009  
Measuring the evolution of socio-economical structure in an online game

## Academic activities

### *Memberships and foundations*

Member of the ITU Center for Climate IT, since Dec 2022

Creator and administrator of the *datasci.social* Mastodon community, *datasci.social*, since Nov 2022

Coordinator of *NEtwoRks, Data, and Society (NERDS)* research group at IT University of Copenhagen, *nerds.itu.dk*, Denmark, Oct 2022 – May 2024

ITU representative of *Det Nationale Videnscenter for Cykelfremme (Danish Centre for Cycling Knowledge)*, since Mar 2022

Co-founder and member of *NEtwoRks, Data, and Society (NERDS)* research group at IT University of Copenhagen, *nerds.itu.dk*, Denmark, since Apr 2019

### *Editorial service*

Review editor at *Frontiers (Social Physics)*  
since Jun 2018

Editor at *Complex Systems*  
since Jan 2018

Editor at *International Journal of Geo-information*  
Aug 2019 – Oct 2023

Editor at *PLOS ONE*  
Dec 2017 – Sep 2022

Handling editor at *PLOS ONE* collection *Science of Stories*  
Jan 2019 – Jun 2019

Guest Editor at *International Journal of Geo-Information, Human-Centric Data Science for Urban Studies*  
Dec 2017 – Apr 2019

Guest Editor at *EPJ Data Science, Individual and Collective Human Mobility: Description, Modelling, Prediction*  
May 2017 – Jan 2018

### *Review service*

*Journals:* Nature, Nature Communications, Nature Sustainability, Nature Human Behaviour, PNAS, Science Advances, Nature Computational Science, Physical Review Letters, Physical Review E, New Journal of Physics, Europhysics Letters, Social Networks, Journal of The Royal Society Interface, Royal Society Open Science, Scientific Data, PLOS ONE, Journal of Statistical Mechanics, EPJ Data Science, Condensed Matter Physics, Frontiers, Transportation, Environment and Planning B, Games, ACM Transactions on Knowledge Discovery from Data, IEEE Transactions on Network Science and Engineering, IEEE Transactions on Knowledge and Data Engineering, IEEE Transactions on Signal and Information Processing over Networks, IEEE Transactions on Intelligent Transportation Systems, GeoInformatica, International Journal of Sustainable Transportation, International Journal of Geographical Information Science, Sustainability, Economics Bulletin

*Publishers:* Cambridge University Press, Chapman & Hall/CRC

*Funding agencies and institutions:* German Research Foundation (DFG), Netherlands Organisation for Scientific Research (NWO), Forum neue Medien Austria, World Bank

*Academic visits*

Complexity Science Hub Vienna, Austria, Apr 2023  
 ISI Foundation, Turin, Italy, May – Jun 2022  
 ISI Foundation, Turin, Italy, Oct 2021  
 ISI Foundation, Turin, Italy, Jun 2019  
 ISI Foundation, Turin, Italy, Jun – Jul 2018  
 Northwestern Institute on Complex Systems (NICO), Northwestern University, Evanston, USA, Jul 2017  
 Center for Complex Network Research, Northeastern University, Boston, USA, Jun – Jul 2017  
 Center for Network Science, Central European University, Budapest, Hungary, Mar – Apr 2016  
 Santa Fe Institute, Santa Fe, USA, Oct 2011  
 Laboratory for Complex Systems, University of Catania, Italy, May – Jun 2011  
 Chair of Sociology, in particular of Modeling and Simulation, ETH Zürich, Switzerland, Feb – Mar 2011  
 Laboratory for Complex Systems, University of Catania, Italy, Sep 2010  
 COST scientific mission at the Institute of Mathematical Sciences, Imperial College London, UK, Aug – Sep 2010

*Advanced training*

*Graph Exploitation Symposium* at MIT Endicott House, USA, Aug 2014  
*Workshop on Information and Decision in Social Networks* at MIT Media Lab, USA, Nov 2012  
*Workshop Computational Social Science* at Harvard University, USA, May 2012  
*SFI Complex Systems Summer School 2010* at the Santa Fe Institute, USA, Jun 2010  
 Summer school *Complex Systems and Social Simulation* at the Central European University, Budapest, Hungary, Jul 2009  
 Summer school *Steps in Evolution* at the Jacobs University Bremen, Germany, Jun 2009

*Organization and committees*

Program Committee member of *CompleNet 2025* in Fortaleza, Brazil, Apr 2025  
 Program Committee member of *IC2S2* in Philadelphia, USA, Jul 2024  
 Program Committee member of *NetSci 2024* in Québec City, Canada, Jun 2024  
 Program Committee member of *CompleNet 2024* in Exeter, UK, Apr 2024  
 Program Committee member of *NetSciX* in Venice Italy, Jan 2024  
 Program Committee member of *Complex Networks 2023* in Nice, France, Nov 2023  
 Program Committee member of *Equitable Accessibility and Sustainable Mobility Workshop 2023 at GIScience 2023* in Leeds, UK, Sep 2023  
 Program Committee member of *IC2S2* in Copenhagen, Denmark, Jul 2023  
 Program Committee member of *CompleNet 2023* in Aveiro, Portugal, Apr 2023  
 Main organizer of *CSH-ITU workshop Sustainable Mobility: Data, Networks, and Complexity* in Vienna, Austria, Apr 2023  
 Program Committee member of *NetSciX 2023* in Buenos Aires, Brazil, Feb 2023  
 Program Committee member of *CityVis 2022* in Potsdam, Germany, Nov 2022

Program Committee member of the CCS 2022 satellite *ComplexDataBlocks* in Palma di Mallorca, Spain, Oct 2022

Co-chair dataset track of *ICWSM-22* in Atlanta, USA, Jun 2022

Program Committee member of *Complex Networks 2021* in Madrid, Spain, Nov 2021

Program Committee member of *MIMODE 2021* in Lyon, France, Oct 2021

Program Committee member of *CCS 2021* in Lyon, France, Oct 2021

Program Committee member of *IC2S2 2021* in Zurich, Switzerland, Jul 2021

Program Committee member of *CompleNet 2021* online, May 2021

Program Committee member of *SocInfo20* in Pisa, Italy, Oct 2020

Program Committee member of *ICCS 2020* in Nashua, USA, Jul 2020

Reviewer of Conference Papers of *IC2S2 2020* in Cambridge, USA, Jul 2020

Program Committee member of *NetSci 2020* in Rome, Italy, Jul 2020

Program Committee member of *CompleNet 2020* in Exeter, UK, Mar 2020

Program Committee member of *NetSci-X 2020* in Tokyo, Japan, Jan 2020

Program Committee member of *Future Cities Challenge 2019* in Oxford, UK, Jul 2019

Program Committee member of *CompleNet 2019* in Tarragona, Spain, Mar 2019

Program Committee member of *Complex Networks 2018* in Cambridge, UK, Dec 2018

Program Committee member of *CCS 2018* in Thessaloniki, Greece, Sep 2018

Program Committee member of *ICCS 2018* in Cambridge, USA, Jul 2018

Program Committee member of *CompleNet 2018* in Boston, USA, Mar 2018

Program Committee member of *Complex Networks 2017* in Lyon, France, Nov 2017

Program Committee member of *CCS 2017* in Cancun, Mexico, Sep 2017

Program Committee member of *ENIC'17* in Duisburg, Germany, Jul 2017

Program Committee member of *IC2S2 2017* in Cologne, Germany, Jul 2017

Program Committee member of the *ICWSM-17 11th International Conference on Web and Social Media* in Montreal, Canada, May 2017

Program Committee member of *COMPLEXIS 2017* in Porto, Portugal, Apr 2017

Program Committee member of the Social Networks and Graph Analysis Track of the *WWW2017 26th International World Wide Web Conference* in Perth, Australia, Apr 2017

Program Committee member of *CompleNet 2017* in Dubrovnik, Croatia, Mar 2017

Program Committee member of *Complex Networks 2016* in Milan, Italy, Dec 2016

Program Committee member of the *CCS 2016 Open Science for an Open Society* satellite in Amsterdam, Netherlands, Sep 2016

Program Committee member of the *ICWSM-16 10th International Conference on Web and Social Media* in Cologne, Germany, May 2016

Program Committee member of the *ICDM2016 Workshop on Data mining for the Analysis of Performance and Success (DAPS 2016)* in Cologne, Germany, May 2016

Program Committee member of the *ICWSM-16 10th International Conference on Web and Social Media* in Cologne, Germany, May 2016

Program Committee member of *COMPLEXIS 2016* in Rome, Italy, Apr 2016

Program Committee member of the Social Networks and Graph Analysis Track of the *WWW2016 25th International World Wide Web Conference* in Montreal, Canada, Apr 2016

Program Committee member of the CompleNet 2016 *Workshop on Complex Networks* in Dijon, France, Mar 2016

Program Committee member of the NetSciX 2016 *Conference on Network Science* in Wroclaw, Poland, Jan 2016

Program Committee member of the ASONAM 2015 *DyNo Workshop on Dynamics in Networks* in Paris, France, Aug 2015

Program Committee member of the ASONAM 2015 *Industry-Track* in Paris, France, Aug 2015

Program Committee member of the *IEEE BigData Congress 2015* in New York City, USA, Jun 2015

Main organizer and Program Committee member of the NetSci 2015 *Satellite NetSci Backstage* in Zaragoza, Spain, Jun 2015

Program Committee member of the ICWSM-15 *9th International Conference on Web and Social Media* in Oxford, UK, May 2015

Program Committee member of the CompleNet 2015 *Workshop on Complex Networks* in New York City, USA, Mar 2015

Program Committee member of the NetSciX 2015 *Conference on Network Science* in Rio de Janeiro, Brasil, Jan 2015

Program Committee member of the SocInfo 2014 track EGG 2014 *Exploration on Game and Gamers Workshop* in Barcelona, Spain, Nov 2014

Program Committee member of the SDM 2014 *Workshop on Mining Networks and Graphs: A Big Data Analytic Challenge* in Philadelphia, USA, Apr 2014

Organizer at the conference *Engaging Data 2013* at MIT, Cambridge, USA, Nov 2013

Program Committee member of the SDM'14 workshop *Mining Networks and Graphs: A Big Data Analytics Challenge* Philadelphia, USA, Apr 2014

Program Committee member of the 3PGCIC 2013 *Social Network Applications* track at University of Technology of Compiegne, France, Oct 2013

Program Committee member of the ECCS 2013 *Multiplex Networks 2013* satellite in Barcelona, Spain, Sep 2013

Program Committee member of the BRICS-CCI & CBIC 2013 *Complex Systems Symposium* in Recife, Brazil, Sep 2013

Reviewer of Conference Papers of the CUPUM 2013 *13th International Conference on Computers in Urban Planning and Urban Management* in Utrecht, Netherlands, Jul 2013

Organizer at the conference *Urban Code* at MIT, Cambridge, USA, Nov 2012

Program Committee member of the *Symposium on Social Networks and Social Contagion* at the Westin Arlington Gateway, USA, Nov 2012

Main organizer and Program Committee member of the ECCS'11 *Satellite XNet – Complexity & Networks* at the Medical University of Vienna, Austria, Jan – Sep 2011

Main organizer and Program Committee member of the *European Conference on Complex Systems 2011 (ECCS'11)* at the Medical University of Vienna, Austria, Oct 2010 – Sep 2011

Main organizer of COST MP0801 workshop *Processes on Networks* at the Medical University of Vienna, Austria, Mar 2010

## Teaching, supervision, and censor work

### Courses

*Geospatial Data Science* (7.5 ECTS credits, 100%), IT University of Copenhagen, Spring 2024

*Introduction to Data Science and Programming* (15 ECTS credits, 70%), IT University of Copenhagen, Fall 2023

*Geospatial Data Science* (7.5 ECTS credits, 75%), IT University of Copenhagen, Spring 2022

*First Year Project* (15 ECTS credits, 30%), IT University of Copenhagen, Spring 2021

*Introduction to Data Science and Programming* (15 ECTS credits, 65%), IT University of Copenhagen, Fall 2020, 2021, 2022

*Introduction to Data Science and Programming* (15 ECTS credits, 50%), IT University of Copenhagen, Fall 2019

*Technical Communication* (7.5 ECTS credits), IT University of Copenhagen, Fall 2019

*Data and Network Visualization* (4 ECTS credits), Central European University, Fall 2018

*Urban Networks and Human Mobility* (4 ECTS credits), Central European University, Fall 2018

*Statistical Methods in Network Science and Data Analysis* (8 ECTS credits), Central European University, Winter 2017/2018

Seminar chair at seminar *Understanding Big Data*, European Forum Alpbach 2016, Aug 2016

### *Single classes*

Class at *IT and Green Transitions*, ITU Copenhagen, Denmark, Oct 2023

Class at *IT and Green Transitions*, ITU Copenhagen, Denmark, Sep 2022

Guest class at *Reflections on Data Science*, ITU Copenhagen, Denmark, Apr 2020

Guest class at *SG2 Analytisches Gestaltungsprojekt*, HfG Schwäbisch Gmünd, Germany (online), Apr 2019

Guest class at *Data and Network Visualization*, Central European University, Budapest, Hungary, Nov 2017

Guest class at *JustData - University Wide Course*, Central European University, Budapest, Hungary, Nov 2017

### *Supervision*

Co-supervisor of BA student Gareth Edward Thomas at ITU Copenhagen, 2024

Co-supervisor of MSc student Frederik Peter Høngaard at ITU Copenhagen, 2023-2024

Co-supervisor of MSc students Julius Thomas Markus Roder and Sebastian Rohr Watt at ITU Copenhagen, 2023-2024

Supervisor of PhD student Clément Sebastiao at ITU Copenhagen, since 2024

Supervisor of MSc student Emil Bak-Møller at ITU Copenhagen, 2023

Supervisor of MSc student Christian Hedegaard Pliess Larsen at ITU Copenhagen, 2023

Supervisor of MSc students Anita Justyna Zielińska and Edi Begovic at ITU Copenhagen, 2023

Supervisor of MSc students Jan Leonard Schelhaas and Peter Gregory Mehler at ITU Copenhagen, 2023

Co-supervisor of MSc student Carlson Moses Büth at ITU Copenhagen, 2022-2023

Co-supervisor of MSc student Henrik Wolf at ITU Copenhagen, since 2022-2023

Supervisor of PhD student Ane Rahbek Vierø at ITU Copenhagen, since 2022

Supervisor of PhD student Anastassia Vybornova at ITU Copenhagen, since 2021

Supervisor of Postdoc Bojan Kostic at ITU Copenhagen, 2021-2022

Co-supervisor of Postdoc Tiago Cunha at ITU Copenhagen, 2020-2023

Co-supervisor of MSc student Anastassia Vybornova at ITU Copenhagen, 2021

Supervisor of MSc students Cecilia Laura Kolding Andersen and Morten Lynghede at ITU Copenhagen, 2021

Supervisor of BA students Edi Begovic and Høgni Ziska Maree Jacobsen at ITU Copenhagen, 2021

Supervisor of Lagrange scholar (Post-MSc level) Marina Klanjčić at ISI Foundation, 2019-2021

Supervisor of PhD student Luis Guillermo Natera Orozco at CEU, 2018-2021

Supervisor of MSc student Albert-Hose Llebaria Holda at ITU Copenhagen, 2020

Supervisor of BA student Martin Bedsted Villandsen at ITU Copenhagen, 2020

Co-supervisor of PhD students, master students, interns, at Medical University Vienna and MIT

### *Censor work*

Examiner for the computer science study programs in Denmark, since April 2022

Examiner for the linguistic and cognitive study programs in Denmark, since June 2021

PhD defense examiner for Mateo Neira at University College London, UK, Mar 2024

PhD defense reviewer at University of Calabria, Italy, Jan 2024

PhD defense examiner for Frank Schlosser at Humboldt University, Berlin, Germany, Apr 2023

PhD defense examiner for Giulia Reggiani at TU Delft, Netherlands, May 2022

PhD defense examiner for Kristoffer Lind Glavind at University of Copenhagen, Denmark, Oct 2021

PhD defense reviewer at Scuola Normale Superiore di Pisa, Italy, Jul 2020

PhD defense reviewer at Universitat de les Illes Balears, Palma, Spain, Jul 2019

PhD defense reviewer at Aalto University, Helsinki, Finland, Aug 2018

PhD defense examiner for Ádám Szántó-Várnagy at Eötvös Loránd University, Budapest, Hungary, Mar 2017

### External research funding

PI (Consortium Partner) in EU Horizon project *JUST STREETS – Mobility justice for all: framing safer, healthier and happier streets*, Jan 2024 – Jun 2027

PI in Danish Ministry of Transport “Cykelpuljen” grant *Netværksanalyse af den danske cykelinfrastruktur*, with PhD student Ane Rahbek Vierø, Jan 2022 – Dec 2024

Co-leader in a sub-award of the Templeton grant *Using Big Data to Quantify and Cultivate Genius*, with Albert-László Barabási, Roberta Sinatra, Cesar Hidalgo, Sep 2018 – Aug 2021

The sub-award was won but declined.

Premium postdoctoral researcher in the Hungarian Academy of Sciences (MTA) grant *Conflict and Controversy in Large Social Networks*, Sep 2016 – Sep 2019

Due to assuming an Assistant Professor position at CEU, I discontinued this grant in Oct 2017.

Key research personnel in the Air Force Office of Scientific Research (AFOSR) grant *The Fundamentals of Predictability of Scientific Success*, with Albert-László Barabási, Alessandro Vespignani, Roberta Sinatra, Feb 2015

Key research personnel in the Austrian Science Fund (FWF) project P23378, *Quantifying socio-economic multiplex networks in a massive multiplayer online game*, with Stefan Thurner, Sep 2011 – Oct 2015

Although this grant was funded, I did not assume the position due to my move to Boston (MIT) in 2012.

### Travel and other grants

CEU ACRO Teaching development grant, Dec 2017



Industry support for organizing NetSci 2015 satellite NetSci Backstage, Jun 2015

Travel and accommodation support to one-month academic visit by ETH Zurich, Feb 2011

Travel grant from Österreichische Forschungsgemeinschaft to ECCS 2010, Sep 2010

Travel grant from the European Cooperation in Science and Technology, Action MPo801 Physics of Competition and Conflicts, to two-month academic visit to Imperial College, Aug-Sep 2010

Full travel and accommodation grant from Santa Fe Institute for three-week SFI Complex Systems Summer School 2010, Jun 2010

## In the media

My research and projects have been featured in, among others:

The New York Times, Le Monde, Scientific American, MIT Technology Review, MIT Frontpage Spotlight, MIT News, Nature News, Science News, National Geographic, Frankfurter Allgemeine Zeitung, The Guardian, Fast Company, The Huffington Post, Der Spiegel, Forbes, Newsweek, NBC News, The Atlantic, Citylab, Bild der Wissenschaft, Fortune, Ingeniøren / Mobilitytech, Yahoo! Finance, New York Magazine, Salon, Physorg, IEEE Spectrum, Quattroruote, Il sole 24 ore, La Stampa, Science Daily, Neue Zürcher Zeitung, 20 Minuten, Público, Austrian National Radio Ö1, Austrian National Radio FM4, ORF Science, Der Standard, Die Presse, Wiener Zeitung, Salzburger Nachrichten, OÖ Nachrichten, Kleine Zeitung

## Policy impact

My research has been cited by:

OECD/ITF, Towards the Light: Effective Light Mobility Policies in Cities, 2023

European Commission, New perspectives on territorial disparities, 2022

WHO, Walking and cycling: latest evidence to support policy-making and practice, 2022

World Bank, Mobility and Resilience: A Global Assessment of Flood Impacts on Road Transportation Networks, 2022

World Bank, Adapting Mobility-as-a-Service for Developing Cities: A Context-Sensitive Approach, 2021

OECD/ITF, Ready for Take-off? Integrating Drones into the Transport System, 2021

World Bank, Big Data in Transportation: An Economics Perspective, 2020

## Awards and exhibitions

City Vis 2022 shortlisted in Research for *GrowBike.Net*, Nov 2022

Research Environment of the Year 2022 for NERDS, Copenhagen, June 2022

Permanent exhibition of *What the Street!?* in Futurium in Berlin, Germany, from Sep 2019

City Vis 2018 award in Art & Advocacy for *What the Street!?*, and exhibition in Berlin, Germany, Oct 2018