

# Tessa Swanson

## Profile

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### Contact:

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GitHub: [tswan](https://github.com/tswan)  
Research Group: <https://guikema.engin.umich.edu>

### Summary:

I am a data scientist with experience in machine learning, risk analysis, and transportation modeling seeking to work at the intersection of technology and systems-level planning for community resilience. My graduate research involves evaluating large-scale spatiotemporal data from smart phones to identify mobility patterns and behavioral responses to hazardous events to quantitatively describe the relationship between access to essential services and recovery. I believe equitable access to essential services and resources is a key component of climate change adaptation, disaster mitigation, sustainability, and resiliency. I aspire to contribute to innovative planning, policy, and infrastructure solutions that promote equitable access, thus enabling resilient communities.

### Skills:

Methods: Simulation, optimization, machine learning, analytics, risk science, GIS, data visualization, database management, scenario planning, collaborative planning, travel demand forecasting, network modeling, stated preference surveys, econometrics  
Tools: Python, R, ArcGIS, PostgreSQL, Keras, Gurobi, TransCAD, Cube, Tableau  
Professional: Trans-disciplinary research, project management, design thinking

## Education

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University of Michigan, Ann Arbor, Michigan (expected) 2023  
Ph.D. Candidate in Industrial and Operations Engineering  
Advisor: Seth Guikema  
Taubman College of Urban Planning Graduate Certificate in Urban Informatics

**Northwestern University**, Evanston, Illinois  
B.S. Industrial Engineering and Management Sciences  
Minors in Transportation and Logistics, Religious Studies  
Murphy Institute Scholar

2016

## **Professional Experience**

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**Steer**, Boston, MA

Aug 2016-Aug 2018

Consultant

- Produced ridership and revenue forecasts using network and econometric modelling techniques for intercity and regional rail, toll facilities, and ferries for both public and private sector clients
- Developed software tools for rail clients to run their own ridership, cost, and revenue forecasts for new and existing corridors and networks
- Created, implemented, and analyzed stated-preference surveys for travel-time and mode alternatives for tollway, ferry, and aerial tramway proposals
- Collected and analyzed terabytes of origin-destination, toll transaction, rail ridership, and economic data
- Visualized descriptive and forecasted results using including maps and network models

**Volpe National Transportation Systems Center**, Cambridge, MA

Summer 2015

Operations Research Analyst Student Trainee

- Consulted the Federal Aviation Administration on the implementation of NextGen Air Transportation System technologies and procedures
- Researched impacts of large-scale GPS failure disasters on US air traffic control systems
- Performed predictive analysis for planning and construction of aviation facilities
- Developed and reviewed federal aviation business reporting software

**American Red Cross**, Chicago, IL

June 2013-Dec 2014

Volunteer Dispatcher and Data Analyst

- Collected and analyzed incident data for organization responding to 1,200 local disasters annually
- Communicated with volunteers, local first responders, and disaster victims to provide appropriate assistance

## **Teaching Experience**

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**Simulation Design and Analysis (IOE 574)** Graduate Student Instructor  
College of Engineering, University of Michigan

Fall 2021

## **Publications**

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**Swanson T**, Guikema S (2022). Using mobile phone data to evaluate access to essential services surrounding disruptive events. *Risk Analysis*. (under review).

**Swanson T**, Guikema S, Bagian J (2022). Beyond vaccination: a risk-Informed approach to defense in depth for COVID-19 response. *Scientific Reports*. (under review).

**Swanson T**, Zelner J, Guikema S (2022) COVID-19 has illuminated the need for clearer AI-based risk management strategies, *Journal of Risk Research*, 25:10, 1223-1238, <https://www.tandfonline.com/doi/ref/10.1080/13669877.2022.2077411>

**Swanson T**, Guikema S, Bagian J, Schemanske C, Payne C (2022) COVID-19 aerosol transmission simulation-based risk analysis for in-person learning, *PLoS ONE* 17(7): e0271750. <https://doi.org/10.1371/journal.pone.0271750>

**Swanson T**, Guikema S, Bagian J, Payne C. (2021). Modeling COVID-19 aerosol transmission in primary schools. *MedRxiv*. <https://www.medrxiv.org/content/10.1101/2021.12.08.21267499v1> (preprint).

## **Presentations**

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**Swanson T**. “Cell phone data for quantifying disaster recovery.” Oral presentation, American Association of Geographers Annual Meeting, Denver, CO 2023.

**Swanson T**, Guikema S. “Cell phone data for quantifying disaster recovery.” Oral presentation, Society for Risk Analysis Annual Meeting, Tampa, FL 2022.

**Swanson T**, Guikema S. “Using mobile phone data to evaluate access to essential services surrounding disruptive events.” Oral presentation, Michigan University-wide Sustainability and Environment Annual Conference, Virtual, 2022.

**Swanson T**, Guikema S, Bagian J, Schemanske C, & Payne C. “Simulating Covid-19 Risks Associated With Returning To In-person College Classes.” Oral presentation, Society for Risk Analysis Annual Meeting, Virtual, 2021.

**Swanson T**, Guikema S. “Using mobile phone data to evaluate access to essential services surrounding disruptive events.” Oral presentation, Society for Risk Analysis Annual Meeting, Virtual, 2021.

**Swanson T**, Guikema S, Bagian J, Schemanske C, & Payne C. “Simulating Covid-19 Risks Associated With Returning To In-person College Classes.” Oral presentation, INFORMS Annual Meeting, Anaheim, CA 2021.

**Swanson T**, Guikema S. “Using mobile phone data to evaluate access to essential services surrounding disruptive events.” Oral presentation, Natural Hazards Researchers Meeting, Virtual, 2021.

**Swanson T**, “Big data for Evaluating Urban Resiliency.” Workshop, Michigan University-wide Sustainability and Environment Initiative, Virtual, 2020.

**Swanson T**, Guikema S. “Travel mode classification of cell phone data in dense urban environments.” Oral presentation, IEEE International Conference on Intelligent Transportation Systems, Auckland, New Zealand 2019.

**Swanson T.**, Fox A, Smilowitz K. “Volunteer Engagement in the Age of Analytics: A Study with the American Red Cross, Greater Chicago Region.” Oral presentation, INFORMS Annual Meeting, San Francisco, CA 2014.

## **Awards and Recognition**

- **Graduate Research Fellowship** 2018-2023  
National Science Foundation
- **Winner – Jeanne X. Kasperson Student Paper Competition** 2023  
Hazards, Risks, and Disasters Specialty Group  
American Association of Geographers
- **Winner - Student Merit Award** 2022  
Engineering and Infrastructure Specialty Group  
Society for Risk Analysis
- **Rackham Predoctoral Fellowship** 2022  
Rackham Graduate School at University of Michigan
- **2<sup>nd</sup> Place - Student Merit Award** 2021  
Engineering and Infrastructure Specialty Group  
Society for Risk Analysis
- **Young Professionals Travelling Fellowship** 2019  
IEEE Intelligent Transportation Systems Conference
- **IEMS Department Award** 2016  
Northwestern University McCormick School of Engineering
- **2<sup>nd</sup> Place - Doing Good with Good OR Student Paper Competition** 2014  
INFORMS Annual Meeting
- **Murphy Scholar** 2012-2016  
Northwestern University McCormick School of Engineering

## **Leadership and Service**

- **Department Steward** 2021-2023  
Graduate Employees’ Organization labor union
- **Front Desk Volunteer** 2022-2023  
Avalon Housing

- **President** 2020-2022  
 Student Leadership Board, UM IOE Department
- **Abstracts and Registration Coordinator** 2021  
**Attendee Logistics Coordinator** 2020  
 Michigan University-wide Sustainability and Environment Conference
- **PhD Student Mentor** 2019-2021  
 INFORMS Student Chapter, University of Michigan
- **Mentorship Chair** 2020  
 INFORMS Student Chapter, University of Michigan
- **Co-President** 2019-2020  
 University of Michigan Grad Student Outdoors Club
- **Graduate Student Mentor** 2019  
 University of Michigan College of Engineering
- **Global Healthcare Technologies Program** 2015  
 Northwestern Center for Innovation in Global Health Technologies,  
 Cape Town, South Africa