



In Partial Fulfillment of the Requirements for the Degree of

Doctor of Philosophy
Yeowon Kim

Will defend her prospectus

Safe-to-Fail Thinking: Decision-Making under Climate Change

Abstract

As cities face increasing risks associated with the non-stationarity of weather-related events caused by climate change, the ability to deploy infrastructure to protect people and maintain services may become a major challenge. Despite limited efforts to avoid temperature rise, we are likely already experiencing extreme events, which are projected to become more severe into the future. While climate prediction has improved substantially, there remains significant uncertainty in these projections due to interrelationships of systems, nonlinearities in biophysical processes, and greenhouse gas mitigation scenarios. This indicates a need for a new approach to infrastructure design that manages risks, but recognizes uncertainties that can result in major impacts upon system failure, and focuses on adaptive capacity. Traditionally, infrastructures are designed as fail-safe – they are designed against infrequent weather events and with little planning for how to manage failure. Yet when failure occurs the consequences to human life and other infrastructure can be enormous. Risk-based fail-safe approaches do not account for the uncertainties associated with climate change, making them inadequate for resilience. On the contrary, safe-to-fail approaches that allow infrastructure to fail but control the consequences of those failures appear to be valuable for a climate impacted future. Yet there remains a lack of clarity on what precisely safe-to-fail means and how it can be implemented towards resilient infrastructure. This study addresses the following questions: 1) What is safe-to-fail? How does it fit with resilience? How might it be useful in promoting urban resilience?; 2) How does safe-to-fail thinking shape different perspectives of decision-making for infrastructure systems? How does it affect current infrastructure design standards?; 3) How can safe-to-fail system be implemented in various institutional and infrastructural settings? The questions will be answered by analyzing infrastructure vulnerability to urban flooding in two metropolitan cities, Phoenix and Mexico City,

and by comparing opportunities and barriers to transform decision-making practices and incorporate safe-to-fail framing in the designing and managing of infrastructure in these cities.

Wednesday, April 12, 2017
1:00 p.m.
College Avenue Commons, Room 501

Faculty, students, and the public are invited.

Supervisory Committee:

Dr. Mikhail Chester (Chair)
Dr. Hallie Eakin (Member)
Dr. Thaddeus Miller (Member)