

<b>UTC Project Information</b>	
Project Title	Understanding Interdependencies between Systems towards Resilient Critical Lifeline Infrastructure in the Pacific Northwest
University	Oregon State University
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Funding Source(s) and Amounts Provided (by each agency or organization)	University of Washington PacTrans \$30,000 Cascadia Lifeline Program (CLiP) \$30,000
Total Project Cost	\$60,000
Agency ID or Contract Number	DTRT13-G-UTC40
Start and End Dates	September 16, 2015– September 15, 2016
Brief Description of Research Project	<p>The objective of this proposal is to pursue a fundamental understanding of the interdependencies between systems, towards resilient critical lifeline infrastructures in the Pacific Northwest for future smart cities.</p> <p>In pursuit of this goal, the research questions of this proposal are to:</p> <ol style="list-style-type: none"> <li>1. Formulate the stochastic interdependency in various interdependent infrastructure net- work disruptions</li> <li>2. Assess lifeline infrastructure interdependencies by identifying key links between each system and the other lifeline networks that interact with it.</li> <li>3. Recommend measures to secure and recover interoperability and avoid damage related to collocation and loss of resources from other interdependent lifelines.</li> <li>4. Address current shortfalls in the absence of performance measures that account for lifeline interdependencies.</li> </ol>

<p>Describe Implementation of Research Outcomes (or why not implemented)</p> <p>Place Any Photos Here</p>	<p>The project conducted a comprehensive literature review on the current infrastructure interdependencies studies. We identified that there is a gap between scientific methods and engineering practice where the theoretical methods cannot be applied to infrastructure networks due to the spatial correlations. Therefore, we developed a percolation simulation platform to empirically captures the dynamics in infrastructure network robustness facing cascading failure. Different sets of interdependency parameters are experimented in the simulation. The results are presented in the project report.</p>
<p>Impacts/Benefits of Implementation (actual, or anticipated)</p>	<p>The results reveal the extremely vulnerability of our interdependent infrastructure system in face of disruptions. Using the giant component as the representation of network robustness, the critical percolation process provides us a way to pin point the exact damages under different damage scenarios. Moreover, the identified critical percolation threshold, the point where the giant component diminishes, allow us to measure the robustness of the system. And it also provides the decision-maker a tool to implement targeted protections on those critical infrastructures in order to prevent the system from complete failure.</p>
<p>Web Links</p> <ul style="list-style-type: none"> <li>• Reports</li> <li>• Project Website</li> </ul>	<p><a href="https://depts.washington.edu/pactrans/research/projects/new-research-project-proposal-understanding-interdependencies-between-systems-towards-resilient-critical-lifeline-infrastructure-in-the-pac-northwest-year-4-2015-2016/">https://depts.washington.edu/pactrans/research/projects/new-research-project-proposal-understanding-interdependencies-between-systems-towards-resilient-critical-lifeline-infrastructure-in-the-pac-northwest-year-4-2015-2016/</a></p>