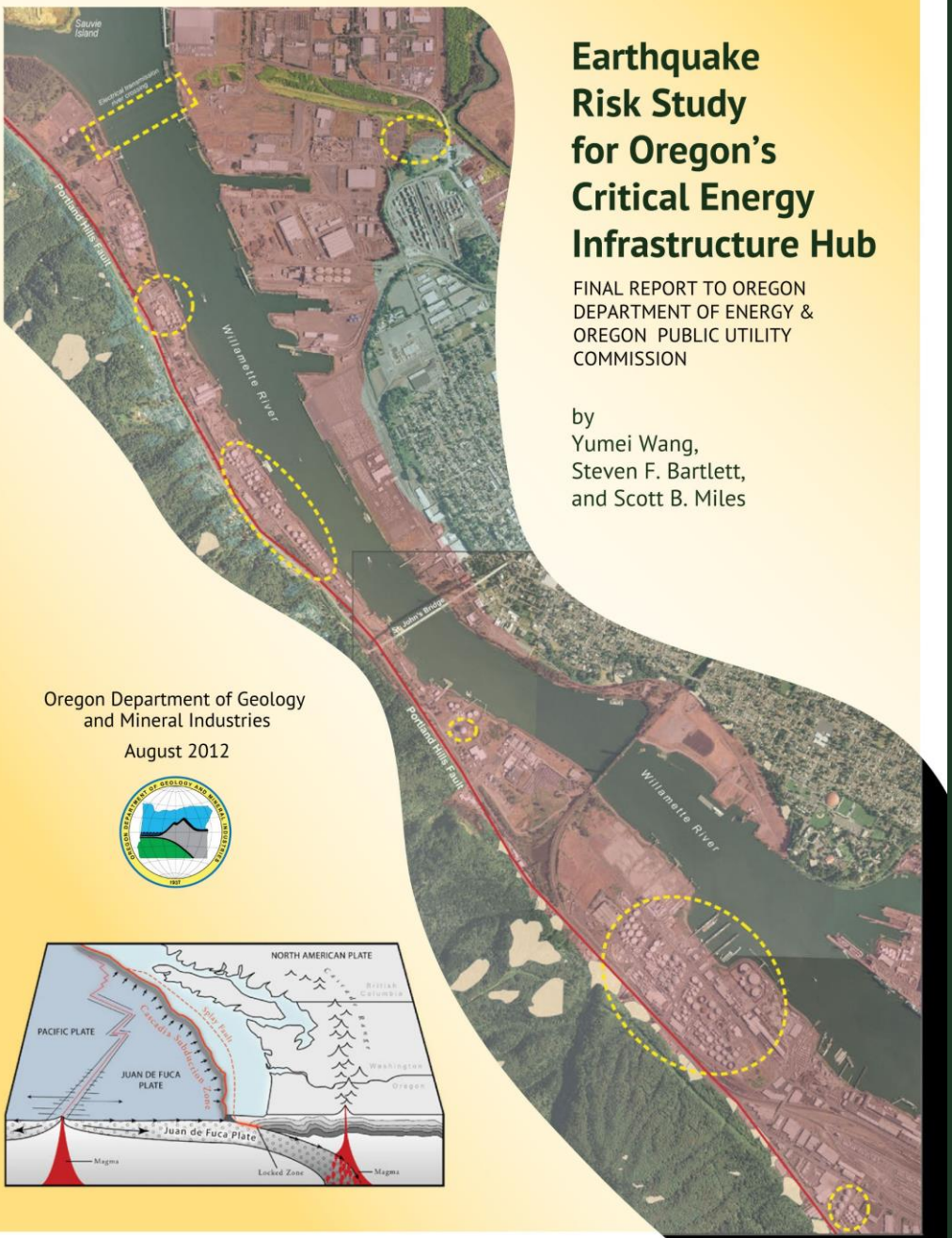
Oregon Context: The Threats to Energy Security

National Governors Association
Improving Resilience in the State of Oregon

YUMEI WANG, OREGON DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES

DECEMBER 11, 2018

Natural Hazards



Earthquake Risk Study for Oregon's Critical Energy Infrastructure Hub

FINAL REPORT TO OREGON DEPARTMENT OF ENERGY & OREGON PUBLIC UTILITY COMMISSION

by
Yumei Wang,
Steven F. Bartlett,
and Scott B. Miles

Oregon Department of Geology and Mineral Industries
August 2012

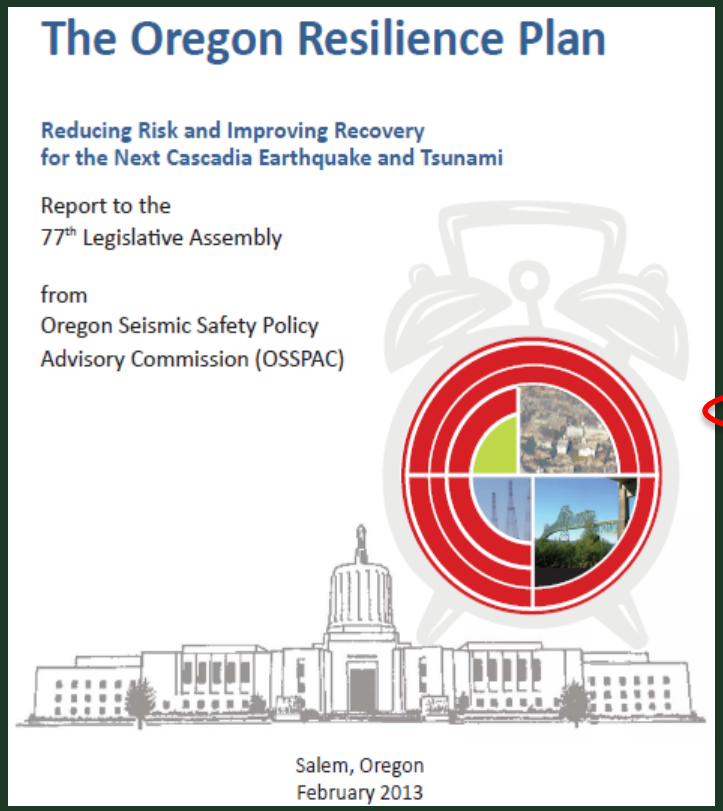
Photo: Y Wang

Photo: Y Wang

2013 Oregon Risk Study on Critical Energy Infrastructure
http://www.oregongeology.org/pubs/ofr/p-O-13-09.htm

IMPACTS: Widespread and Long Term

Cascadia poses a "black sky" hazard



Critical Services	Coast (months)	Valley (months)
Fuel	No Info	No Info
Water	36+	6-12
Wastewater	36+	36+
Electricity	3-6	1-3
Highway (Tier 1)	12-36	12-36
Communication	6-12	6-12
Schools	18	18
Fire	36+	2
Police	36+	4
Healthcare	36+	18

Source: OSSPAC
www.oregon.gov/gov/policy/orr/Documents/Oregon_Resilience_Plan_Final.pdf

Electrical System Vulnerabilities

Shaking, landslides, and liquefaction hazards

Sources: 1999 İzmit Earthquake (Turkey)
UC Irvine CUREE archives
http://vis.eng.uci.edu/~curee/e3/?C=S;O=D
and Chile TCLEE team

Oregon's Fuel Supply Chain Scenario

- Transmission pipeline breaks
- Shipping channel closes Columbia River mouth tsunami damage. Channel slope failure
- Bridges, gas pipelines and electrical river crossings block navigable waterway
- Delivering fuel from east or south and by air are very limited
- Prolonged fuel shortage for post-disaster response and recovery

Yumei Wang, DOGAMI, 2018

Critical Infrastructure Interdependencies

To restore electricity, need to reopen roads

Source: ASCE TCLEE members

To restore water service, need electricity

Source::www.public-domain-image.com

To restore fuel supplies, need electricity

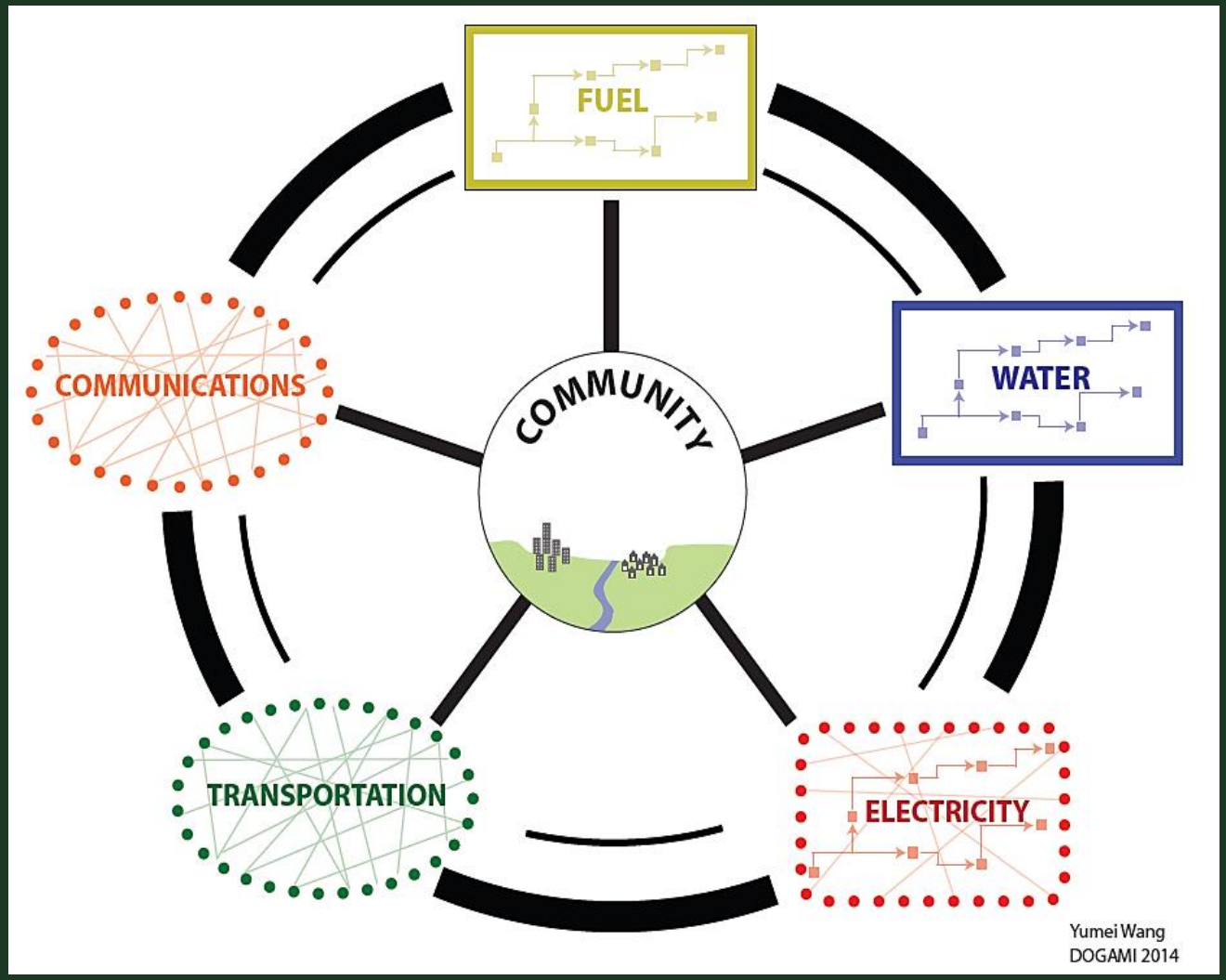
Source: ASCE TCLEE members

To reopen roads, need to restore fuel supplies

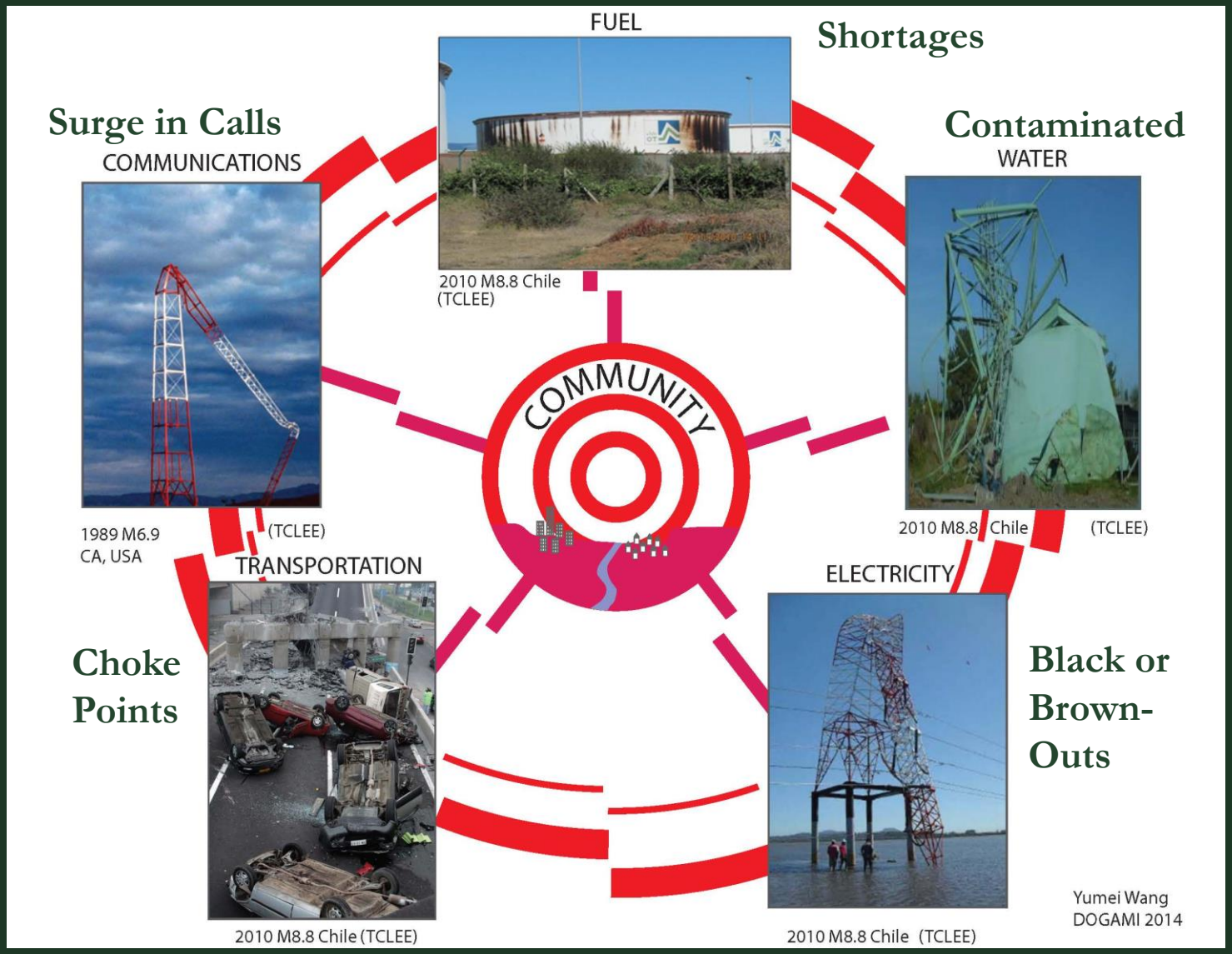
Credit: AP

Yumei Wang, DOGAMI, 2018

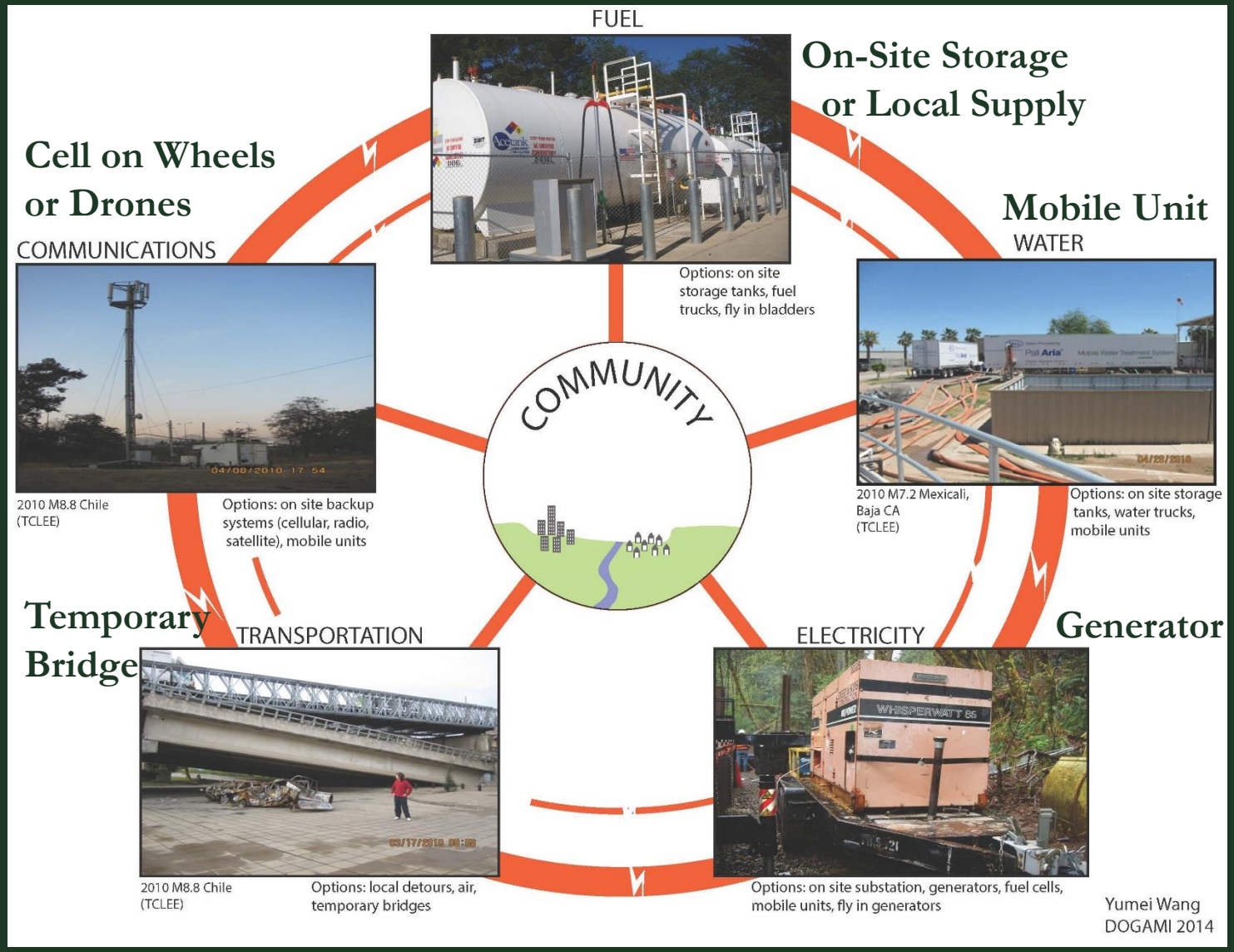
Lifeline Systems “at a glance”



Lifelines During Disaster Conditions

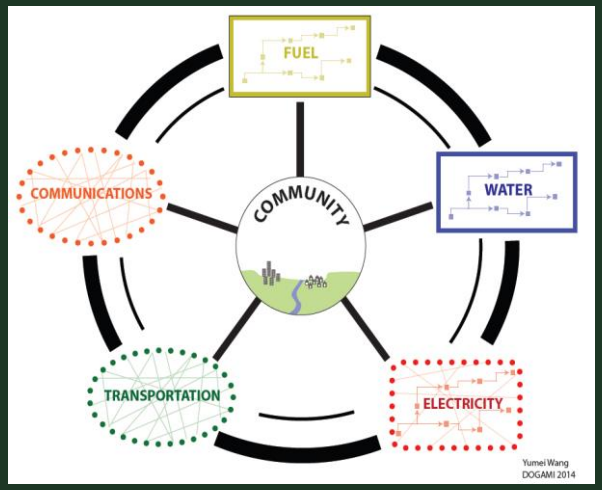


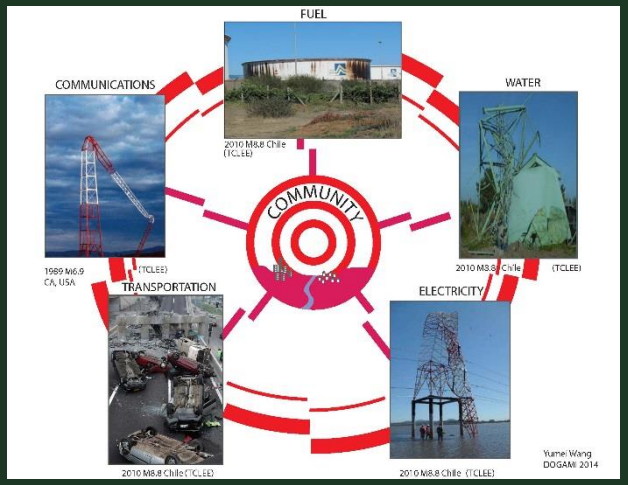
Options During Emergency Response Conditions

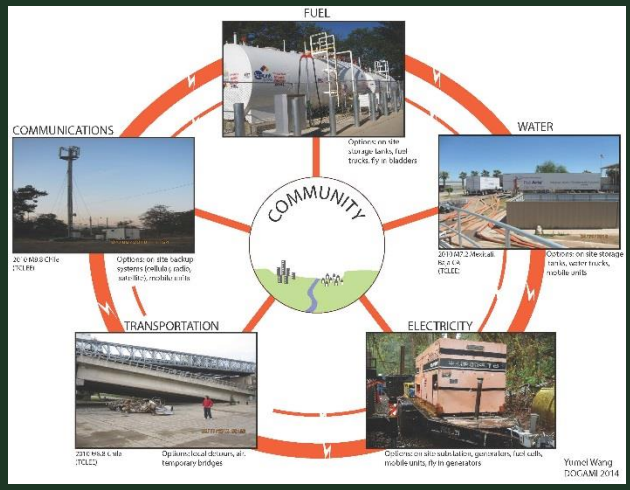


Lifelines

Before, During and After Disasters







Normal Conditions → Disaster Conditions → Emergency Response Conditions

Resilience: How Long to Recover?

Thank you!