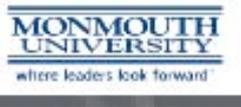




The Center for Secure and Resilient Maritime Commerce (CSR)



Modeling the Influence of Zeroth Responders on the Resilience of a Maritime Enterprises



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2010 DHS Quadrennial Homeland Security Review Report (QHSR)

Solutions to DHS challenges must constitute the ***“national enterprise”*** via a ***“collective effort and shared responsibility ... composed of multiple actors and stakeholders whose roles and responsibilities are distributed and shared.”*** p. 12

How do you architect and express the strategic intent of many as a unified concept of operation and “shared awareness of risks and threats”? p. 36



2010 DHS Quadrennial Homeland Security Review Report (QHSR)

A primary motivation for this work is that as identified in the DHS QHSR, “***neighbor-to-neighbor assistance, when done safely, decreases the burden on first responders, individuals should be seen as force multipliers who may also offer specialized knowledge and skills.***” p. 60



Spontaneous Action

- In the Nimitz Freeway collapse during the 1989 Loma Prieta earthquake, of the 150 people on the freeway, 49 were rescued by lay bystanders, workers in an industrial facility below the Nimitz Freeway (Glass, 2001);
- After the 1979 tornado in Wichita Falls, TX, only 13% of rescued people said they were rescued by emergency officials; 59% of all uninjured victims interviewed had given aid to someone else within minutes, and it was estimated that upwards of 10,000 people were helped (Auf der Heide, 2004);
- In random surveys carried out after the San Francisco Bay Area Earthquake in 1989, two of the six impacted counties (San Francisco and Santa Cruz) indicated that more than 31,000 residents became involved in search and rescue activities in the immediate aftermath of the disaster.



Zeroth Responders

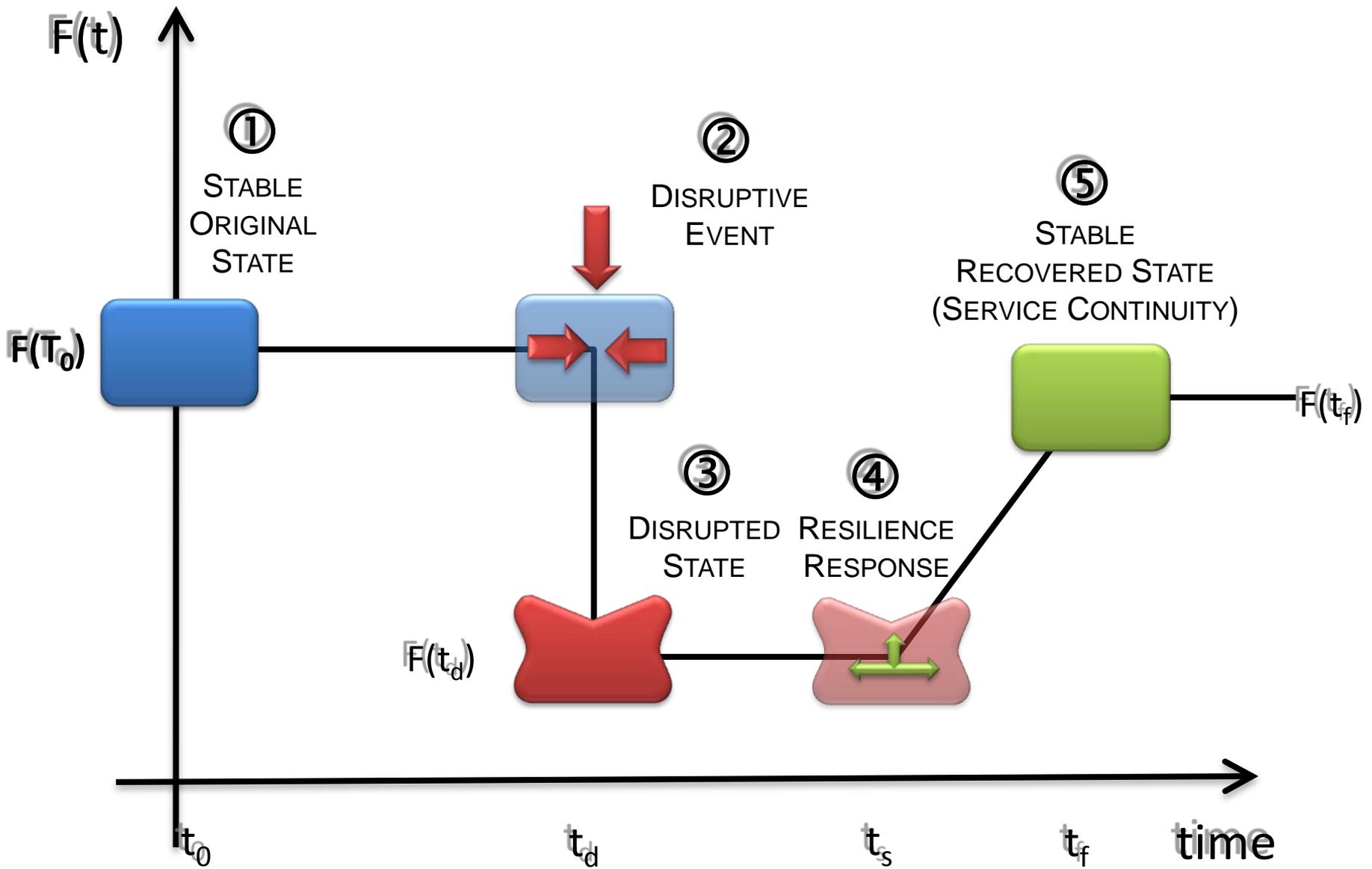
Zeroth Element - an object or value that does not (originally) belong to a given sequence, but which could be naturally placed before its initial element.

Zeroth Law of Thermodynamics - formulated after the first, second, and third laws, but considered more fundamental, hence its name.

Zeroth Responder - individuals acting spontaneously prior to the arrival of coordinated response group, e.g. First Responders

A quantitative and qualitative understanding of the influence of *zeroth responders* on the small vessel security enterprise for effective emergency response and rapidity of recovery (resilience).





Research Approach

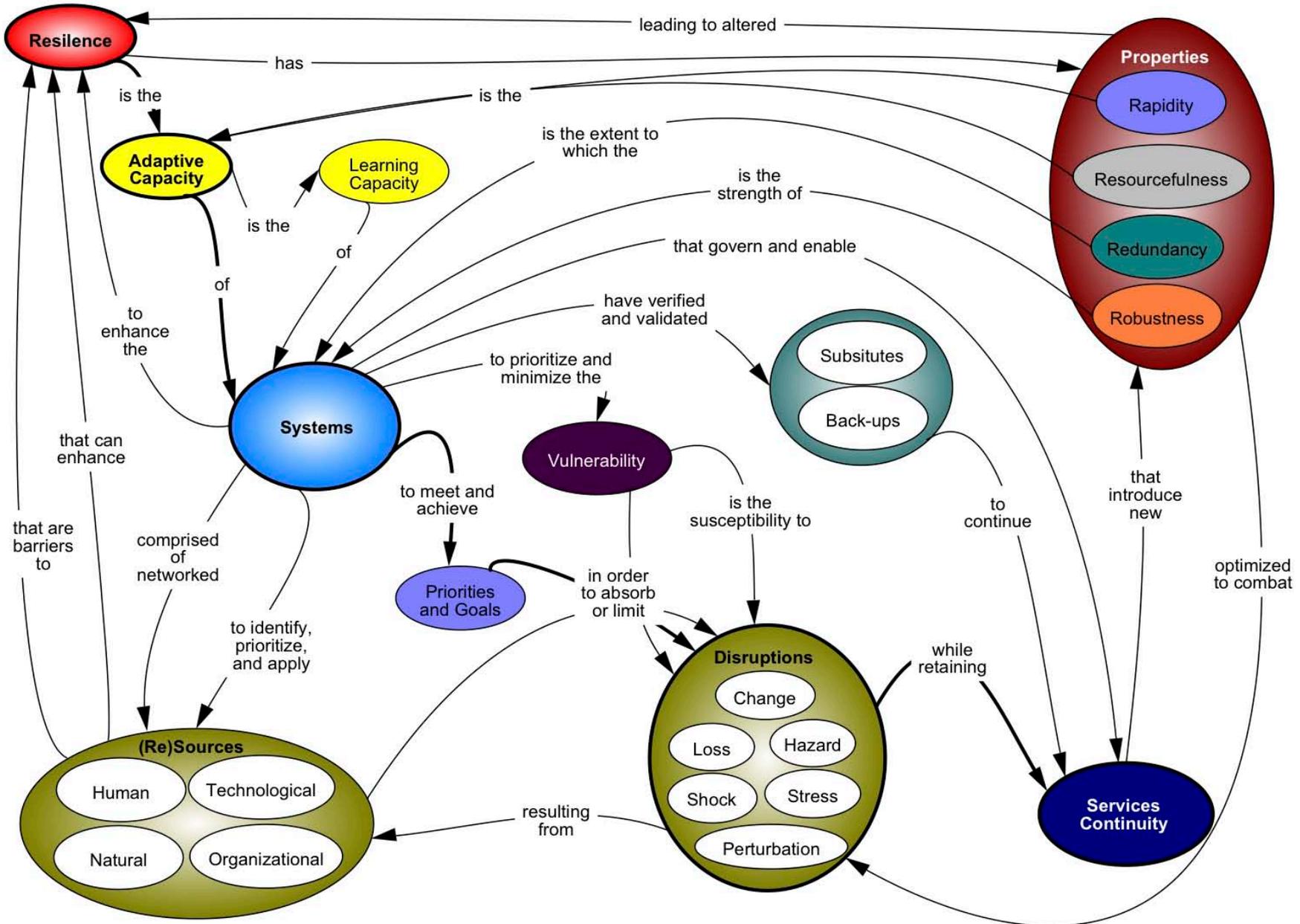
- Problem Understanding
 - Systemigram Modeling for Graphical CONOPS
- Problem Modeling
 - Lay out the mathematical foundations for computing resilience figures-of-merit and metrics, with particular focus on Zeroth Responders and port operations.
- Problem Solutions Analysis
 - *Do Zeroth-Responder strategies improve the resilience of the maritime supply chain?*
 - *Are Zeroth-Responder strategies cost-effective? Are there better alternatives?*
 - *In which part of the system state (with respect to resilience) do Zeroth Responders provide a better impact?*

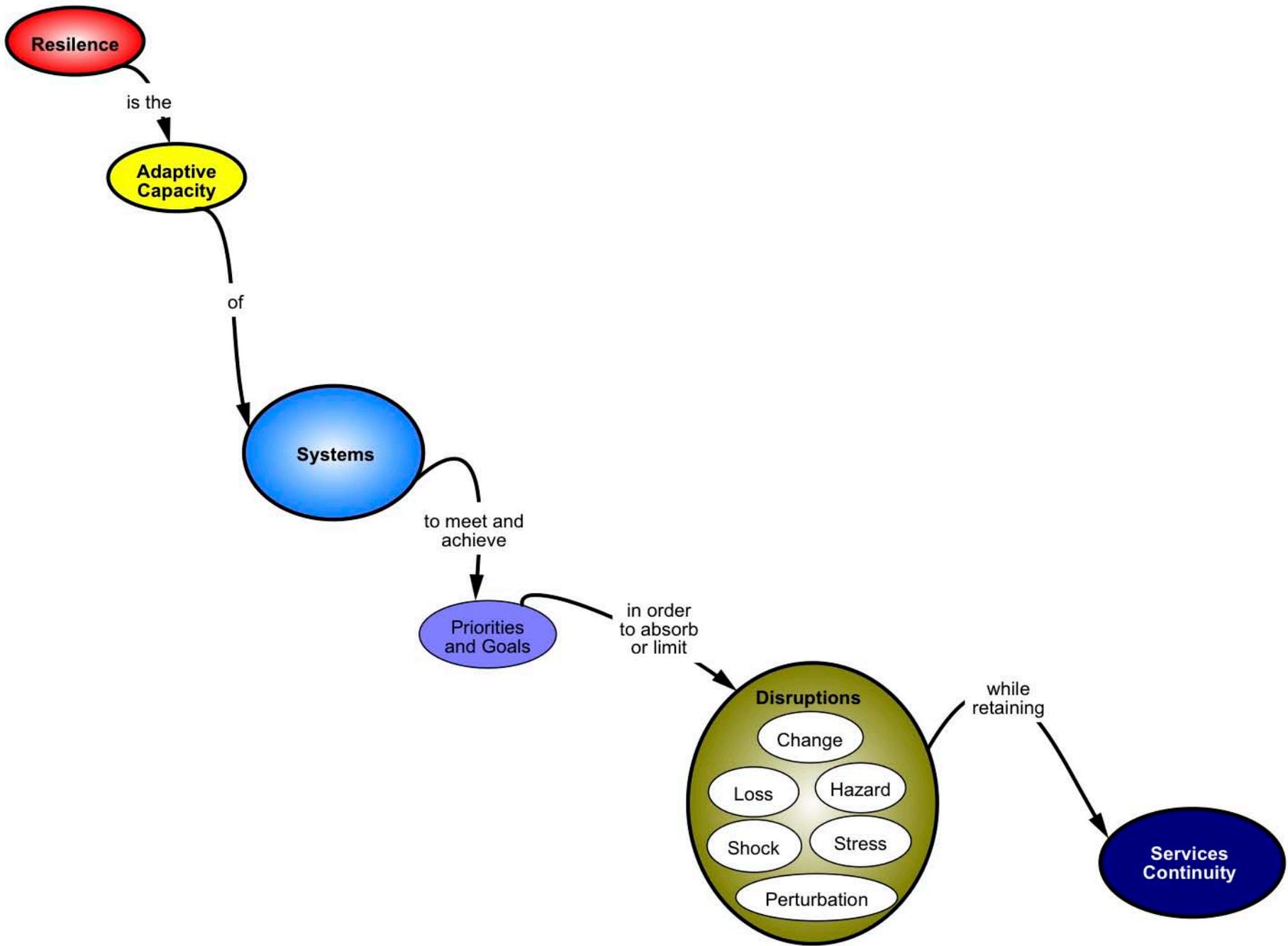


Problem Understanding

WHAT IS RESILIENCE?

Systemic Media Lab

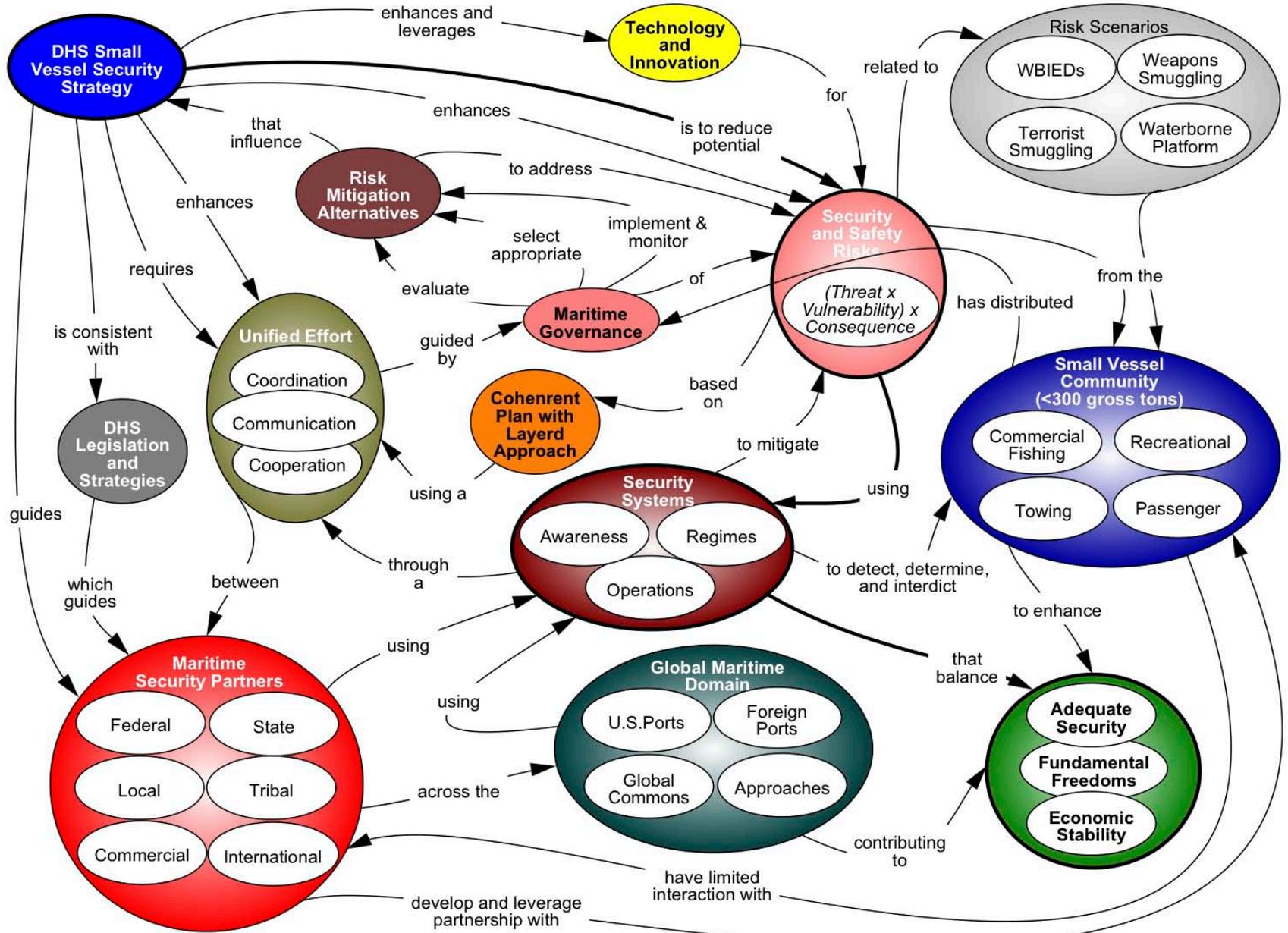




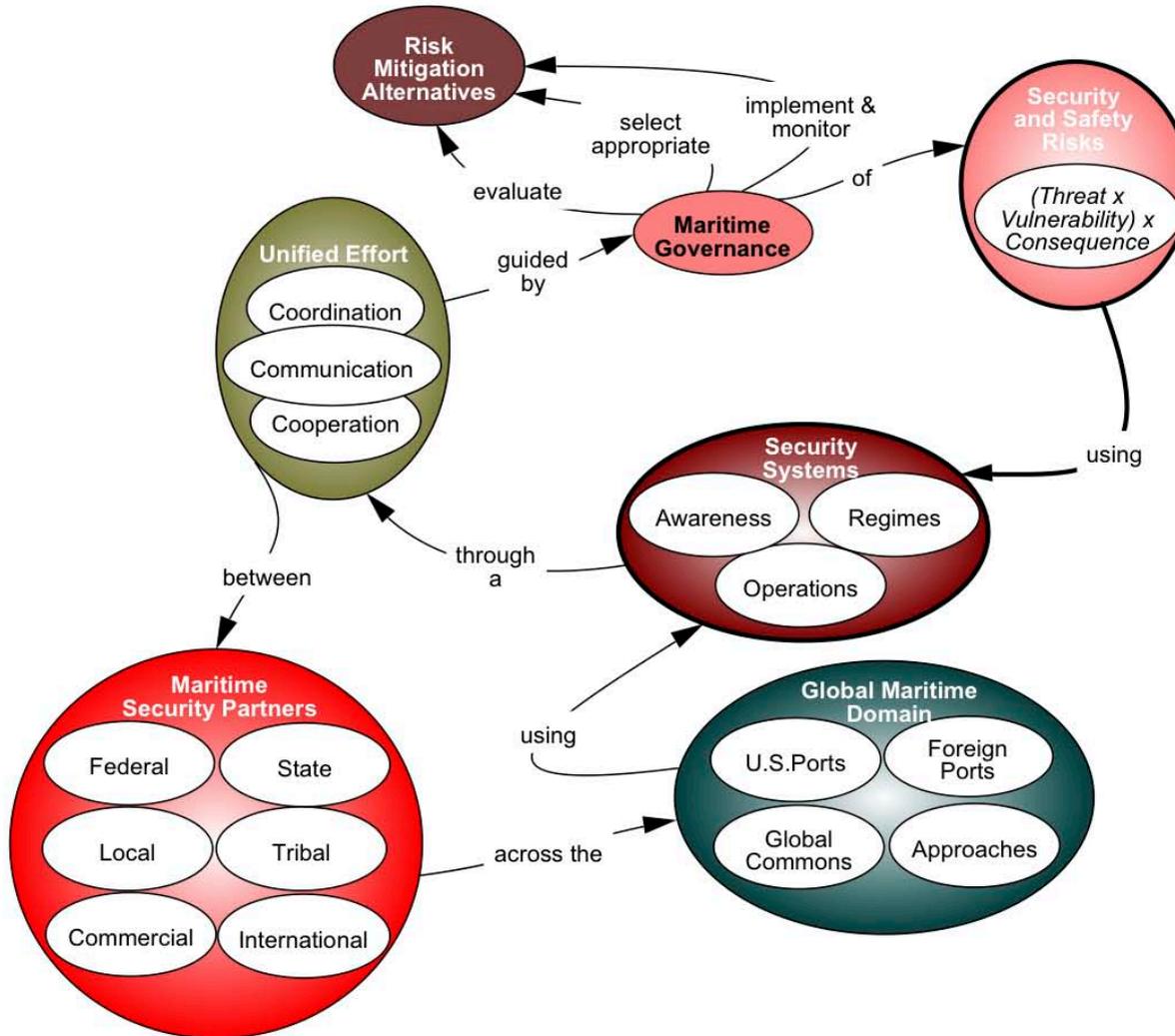
Problem Understanding

Systemic Media Lab

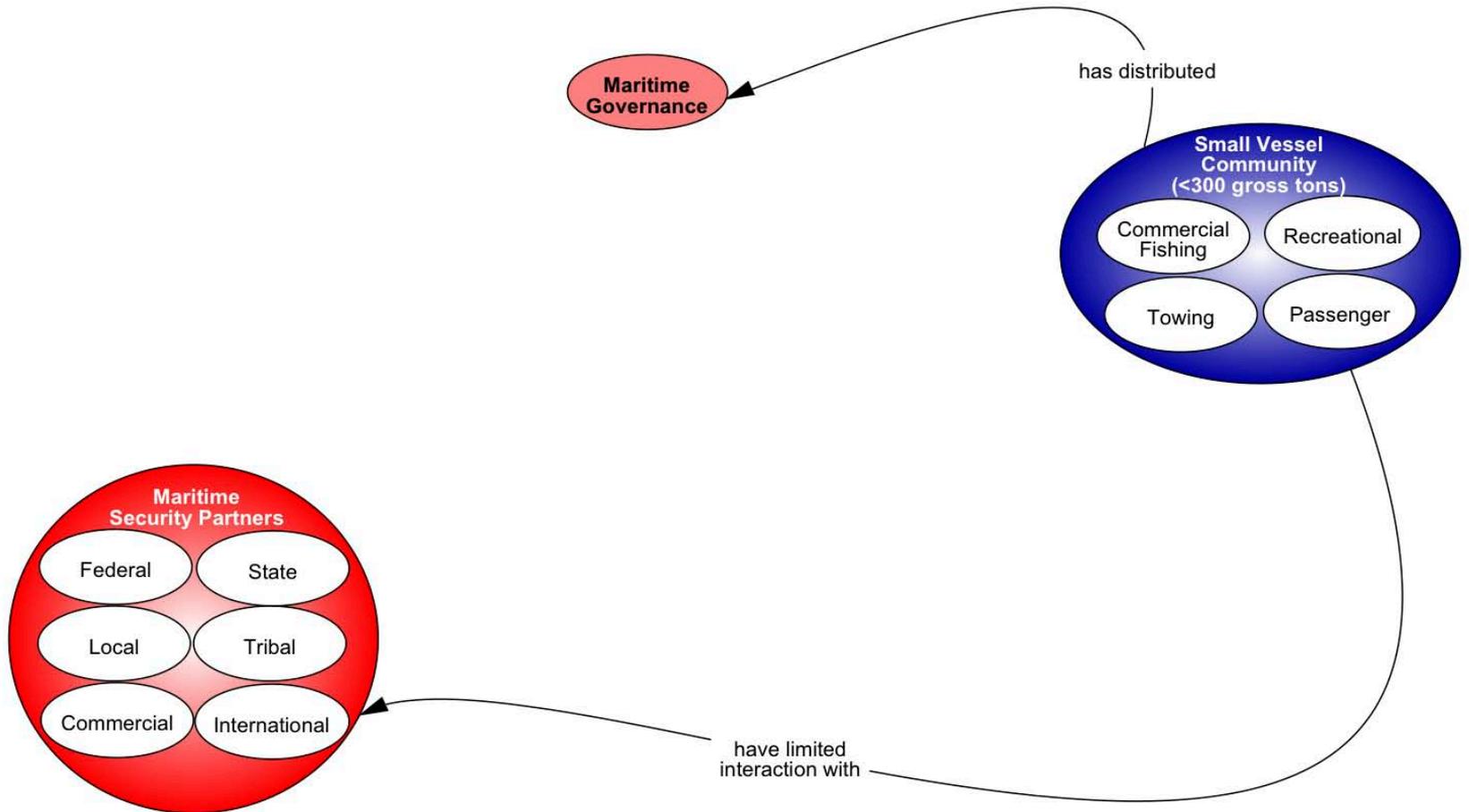
Steven Institute of Technology



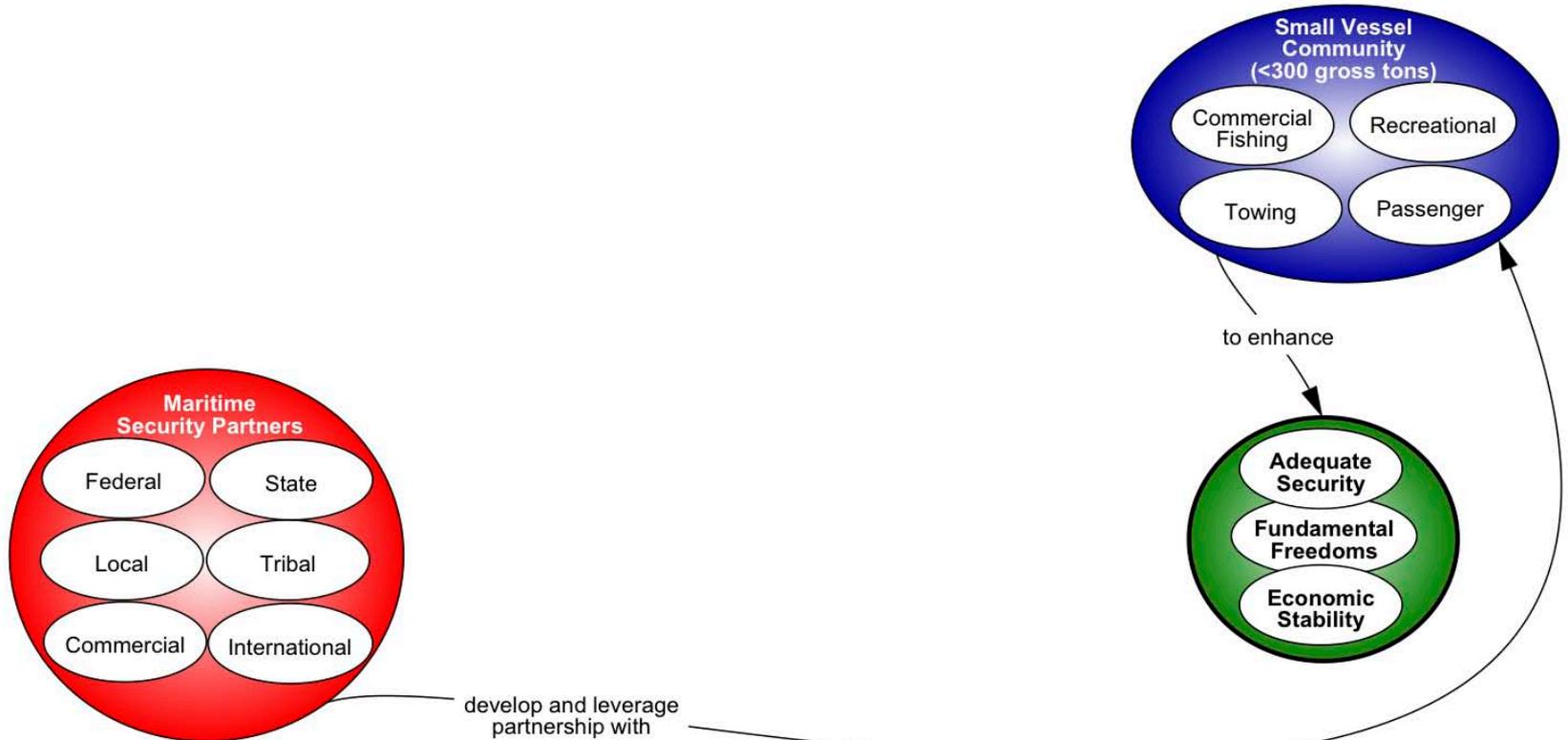
MARITIME GOVERNANCE



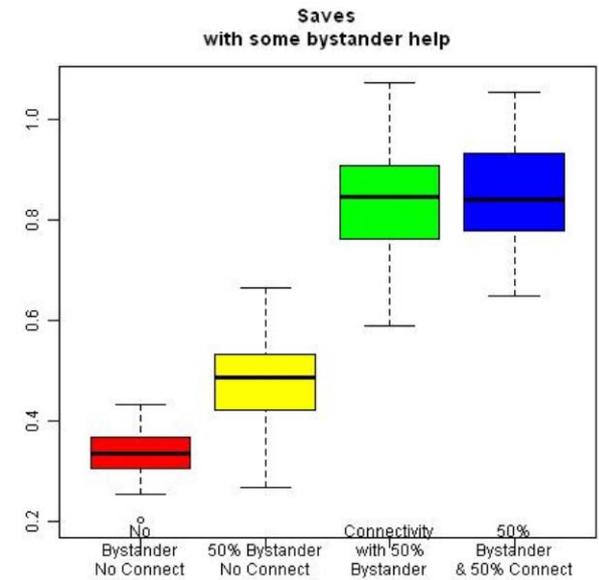
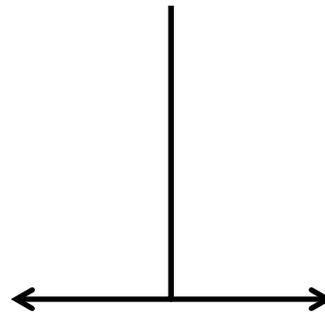
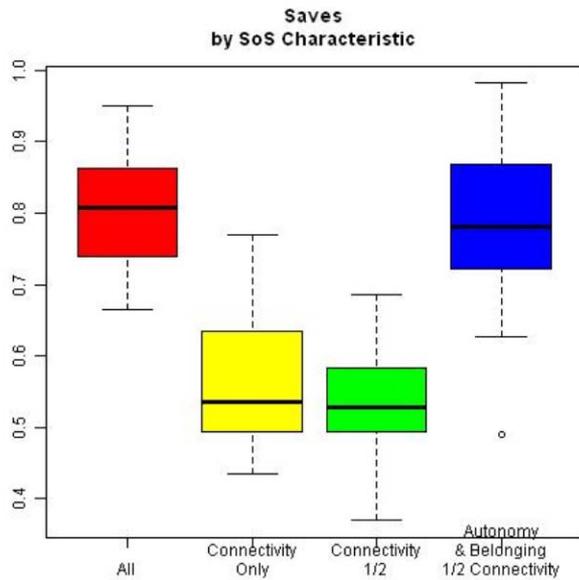
SMALL VESSEL COMMUNITY



MAJOR GOAL A

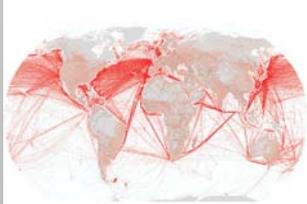


Problem Modeling



Enterprise Resilience Modeling Road Map

Long Range



Create Enterprise Governance methods, processes, tools, and policy that can be used by practitioners and DHS.

Enterprise Governance:
Methods, Processes, Tools,
and Policy for Effective Use
of Zeroth Responders

Medium Range

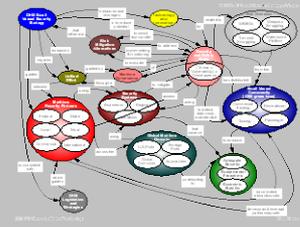
Develop dynamic models and simulations for understanding the relationships in the Systemigram models for guiding Enterprise Governance models.

Models: Simulating a
First Responder
Scenario with Zeroth
Responders

Models: (1) initiation of
disruption; (2) restoration of
system elements to service
continuity

Models: Figures-of-
Merit on Zeroth
Responders and Port
Operations

Short Range



Develop validated Systemigram CONOPS of Enterprises in order to create a library of Systemigram models that can be accessed by the DHS and the public.

Systemigram:
DHS Small Vessel Security
Strategy

Systemigram:
What is Resilience

Systemigram:
Zeroth Responders for Small
Vessel Security

Systemigrams for Enterprise Modeling

2006

2007

2008

2009

2010

2011

2012

