# Objectives of the Workshop

- Development of the virtual coastal community.

    – Hypothetical and ideal scenario
    – Use the developed scenario as a platform for our individual research efforts
    – Use the developed scenario as a benchmark for our individual research efforts
    – Strengthen collaborative ties among broadly distributed research disciplines

- Strategies to initiate integrated scenario simulations

    Seismic faulting --> Tsunami generation --> Propagation --> Runup and coastal effects --> Evacuation

Development of the virvual coastal community

- Bathymetry
- Topography
- Built Environment
- Land-Use Information
- Geotechnical Data
- Vegetation
- Demographics
- Societal Data
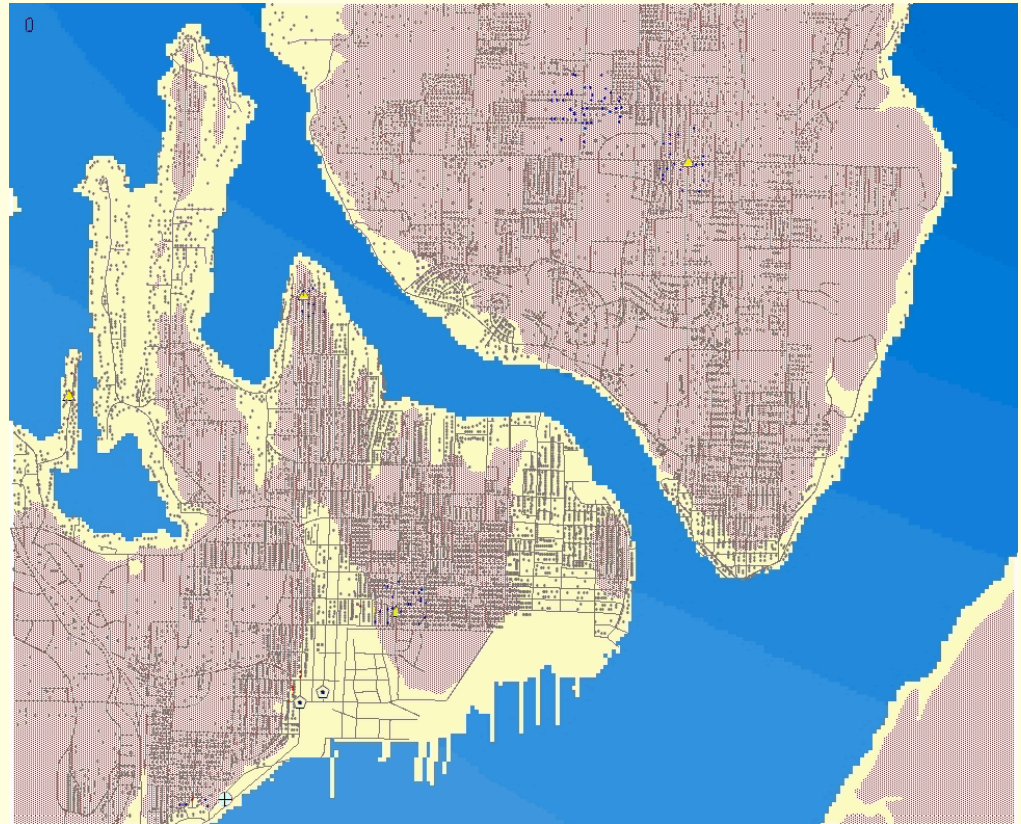
✓ Data & Information Source for the Simulations
✓ Dissemination & Repository of the Simulation Results

as a Benchmark Problem

- Experimental and numerical investigations for landslide generated tsunamis (Cal Tech, USC, NWU, Cornell, URI -- NSF)

- The Third International Workshop on Long-Wave Runup Models: Catalina Island 2004 (Cornell, USC & OSU -- NSF)
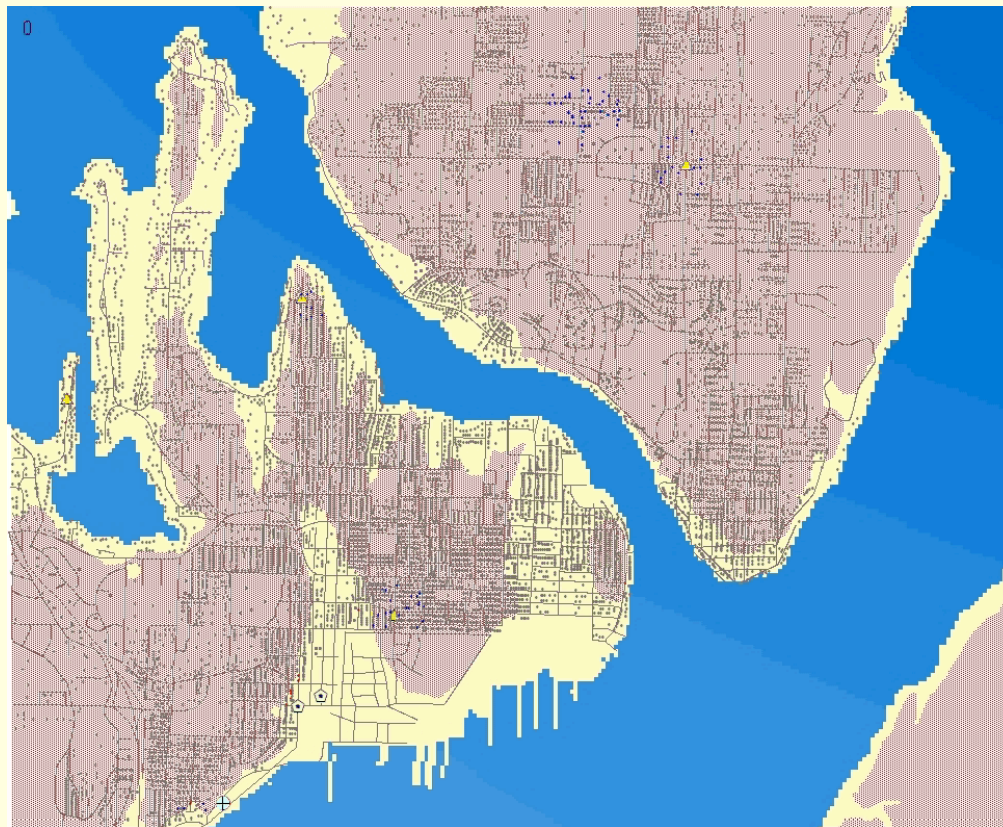
Applications of Research Results

- Experimental and numerical investigations of tsunami structure interactions (UW, SMU, OSU, Cornell -- NSF)
- Seismic/Tsunami Construction, Phase-1: A Pilot Study (OSU, UH -- NTHMP)
- Index Buildings -- the CUREE-Caltech Woodframe Project (FEMA)
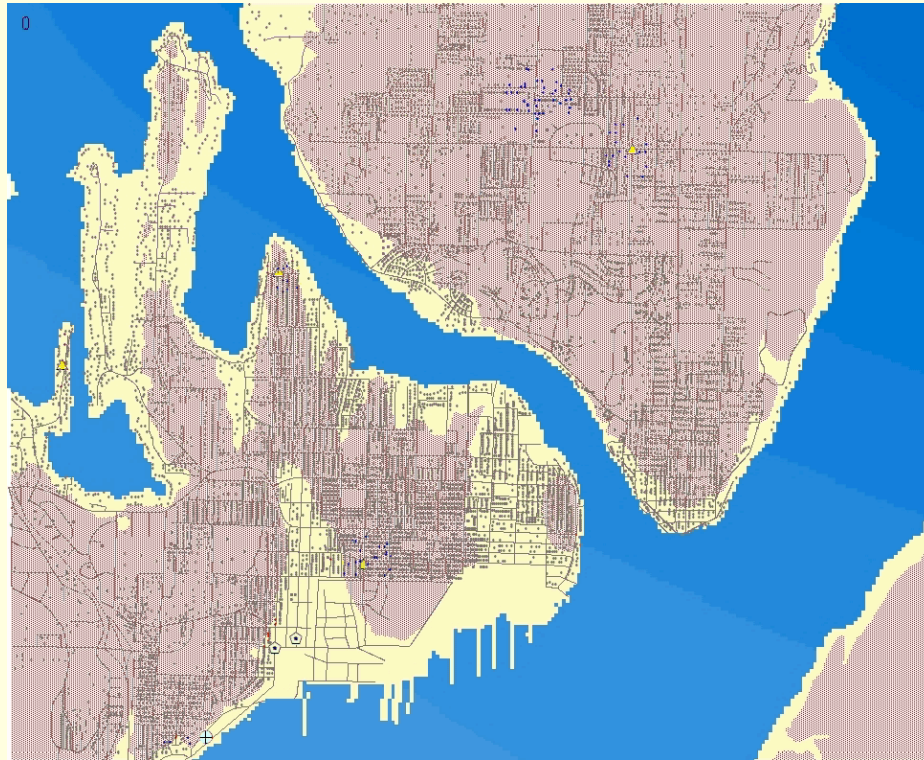
Applications of Research Results

- Experimental and analytical investigations for tsunami soil interactions – scour (OSU, U of Tokyo, NILIM -- NSF &NILIM)

- 3-D tsunamis (OSU, PSU, UW -- NSF)

- Simulation models for warning transmission and evacuation (Gunma, OSU & UNT -- NSF (pending))
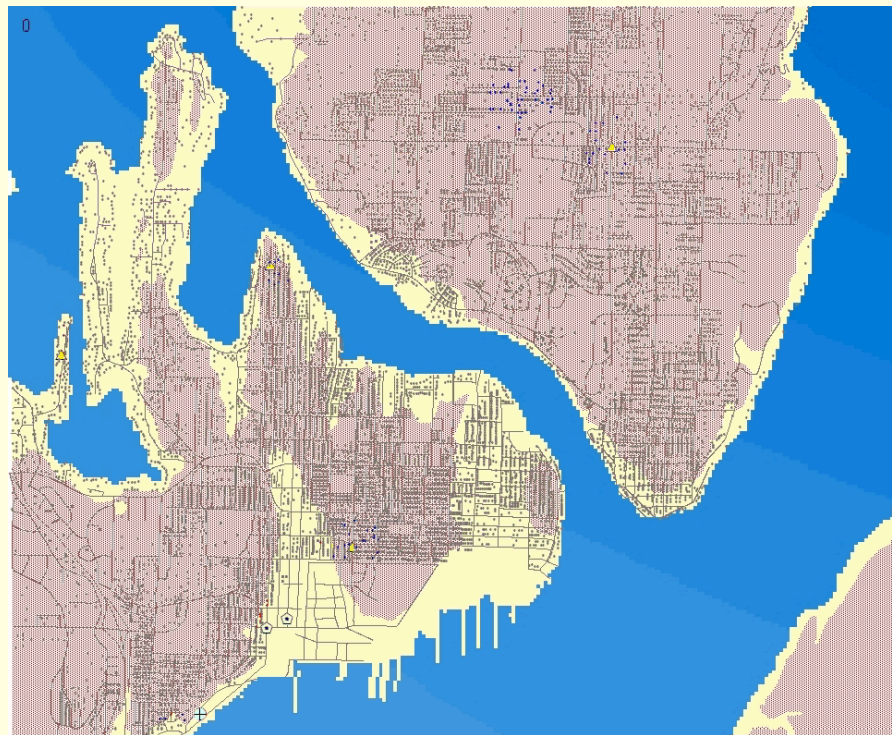
Objectives of the Workshop

- Development of the virtual coastal community.

- **Strategies to initiate integrated scenario simulations**

  – Scenario used as Integrated Simulation Exercise

Possible Integration Schema

1. Seismic Signals & Tsunami Generation

4. Warning

2. Propagation

3. Ground Shake Effects

5. Runup effects

6. Evacuation

7. Assessment, Recovery & Long-Term Effects
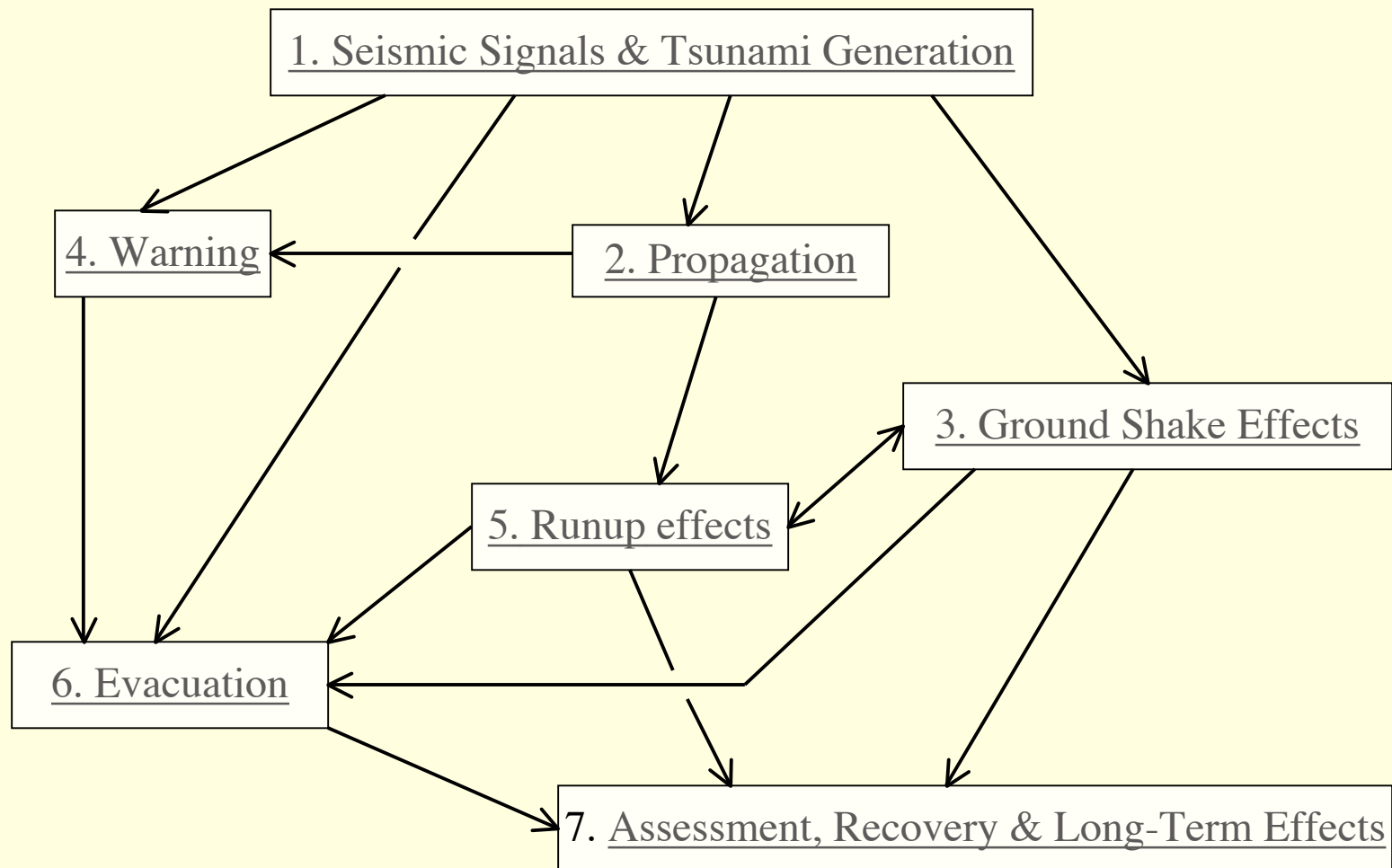
1. Seismic Signals & Tsunami Generation

Tectonic problems – sea floor deformation due to faulting.

Geologic problems – effects of gas-hydrates on submarine slides, etc.

Hydrodynamics – initial tsunami generation

Slump geometry & motion – subaerial and subaqueous landslides

Gravity current – landslide runout

Scenario Earthquake -- USGS: Advanced National Seismic System

http://www.anss.org/

Linkage to Neptune project: http://www.neptune.washington.edu/

Linkage to Earth Scope:

http://dax.geo.arizona.edu/earthscope/about/index.html

2. Propagation

Transoceanic propagation -- hyper-real-time simulations

- Bathymetry – effects of deep-water sills and mounds, friction effects

Interaction with continental slope/shelf

Local 3-D propagation problems

Island problems

Sallow-water model and Boussinesq model

- Community Computational Portals – A Model for Evaluating the Impact of Natural Hazards (OSU, UAK, UH -- NOAA & NSF (pending)).
- PDC/MHPCC Tsunami Modeling: http://www.pmel.noaa.gov/tsunami/pdctm.html

3. Ground Shake Effects

Structures - buildings, storage tanks, marine piles; piers; offshore terminals; breakwaters

Geotechnical Issues - quay-wall stability; liquefaction

Infrastructures - power lines; roads; bridges; tunnels; water supplies

Fires

- SPUR, a Distributed Simulation Framework for Seismic Performance for Urban Regions (UCB, CMU & MSU)

- PEER -- OpenSees (Open System for Earthquake Engineering Simulation)   http://opensees.berkeley.edu/

- The SCEC Community Modeling Environment: An Information Infrastructure for System-Level Earthquake Research
  http://www.scec.org/cme/

4. Warning

- Seismic signals

  Deep-water sensors – NOAA's DART Program:
  http://www.pmel.noaa.gov/tsunami/Dart

  Nearshore sensors – tide gages etc.

  Information transmission

  Decision making

  Future monitoring with Neptune Project:
  http://www.neptune.washington.edu/

- NSF MRE project, EarthScope:
  http://dax.geo.arizona.edu/earthscope/about/index.html

5. Runup Effects

- Bathymetry – critical spatial dimensions for focusing, de-focusing, etc.

  Shallow-water model; Boussinesq model; RAN model; BEM; turbulence model

  Shoaling and breaking

  Motion of the runup tip

  Interaction with objects (man-made coastal structures and natural objects, trees etc.)

  Pickup problem

  Wave forces on coastal structures

  Water-borne missile problem (impact forces)

  Scour and sediment transport

  Wave induced liquefaction

6. Evacuation

- Evacuees' Response

  Information transmission to the general public

  Decision making

  Psychological factors

  Immediate rescue strategy

  Command simulation

  Hospital/Fire/Police/Utilities activities
- Drill and education

7. Assessment, Recovery & Long-Term Effects

- Casualty assessment

  Economical impact assessment

  Environmental impact assessment

  Disaster relief strategies

  Clean-up effort

  Recovery plan

Opportunity

- NEES Grand Challenge (NSF)

- National Tsunami Hazard Mitigation Program (NOAA, USGS, FEMA, 5 Pacific States)

- NSF's Cyberinfrastructure:
  http://www.eng.nsf.gov/general/Workshop/cyberinfrastructure/index.htm

- Proactive municipalities and cities in preparing evacuation plans and educational materials (e.g., Oahu, Hawaii; Eureka, California; Newport, Oregon; Lincoln City, Oregon; Greys Harbor, Washington)

- Hurricane/Tornado simulation efforts

Workshop Agenda

8:40 – 9:10:   Workshop Objectives (Yeh)

9:10 – 9:30:   A Preliminary Scenario Simulation (Katada)

9:30 – 9:50:   SPUR program (Mish)

9:50 – 10:05:   *Coffee/Tea Break*

10:05 – 10:25:   How the Concept of Scenario Simulation Fits into NSF's New Cyberinfrastructure Emphasis? (Pancake)

10:25 – 10:45:   Linkage to the National Program (Gonzalez)

10:45 – 11:00:   NEES Grand Challenge (Yim)

11:00 – 11:50:   Discussion (Liu)

11:50 – 12:00:   Review & Preview (Yeh)

12:00 – 1:00:   *Lunch*

1:00 -- 1:05:   Announcement & Preview (Yeh)

1:05 – 1:40:   Essential Scenario Elements & Linkage to On-Going or Forthcoming Relevant Projects. (Petroff)

1:40 – 2:45:   Discussion of Strategies to Initiate the Simulation Programs (Yeh)

2:45 – 3:00:   *Coffee/Tea Break*

3:00 – 4:30:   Revisit Grand Challenge, Cyberinfrastructure, National Program (Liu)

4:30 – 5:00:   Summary & Conclusion (Yeh & Pancake)

Objectives

- Development of the community scenario(s).
    - Access to the scenario data and information
    - Dissemination & Repository of the scenario simulation (research) results
    - **Form a working group for the development**

- Strategies to initiate integrated scenario simulations