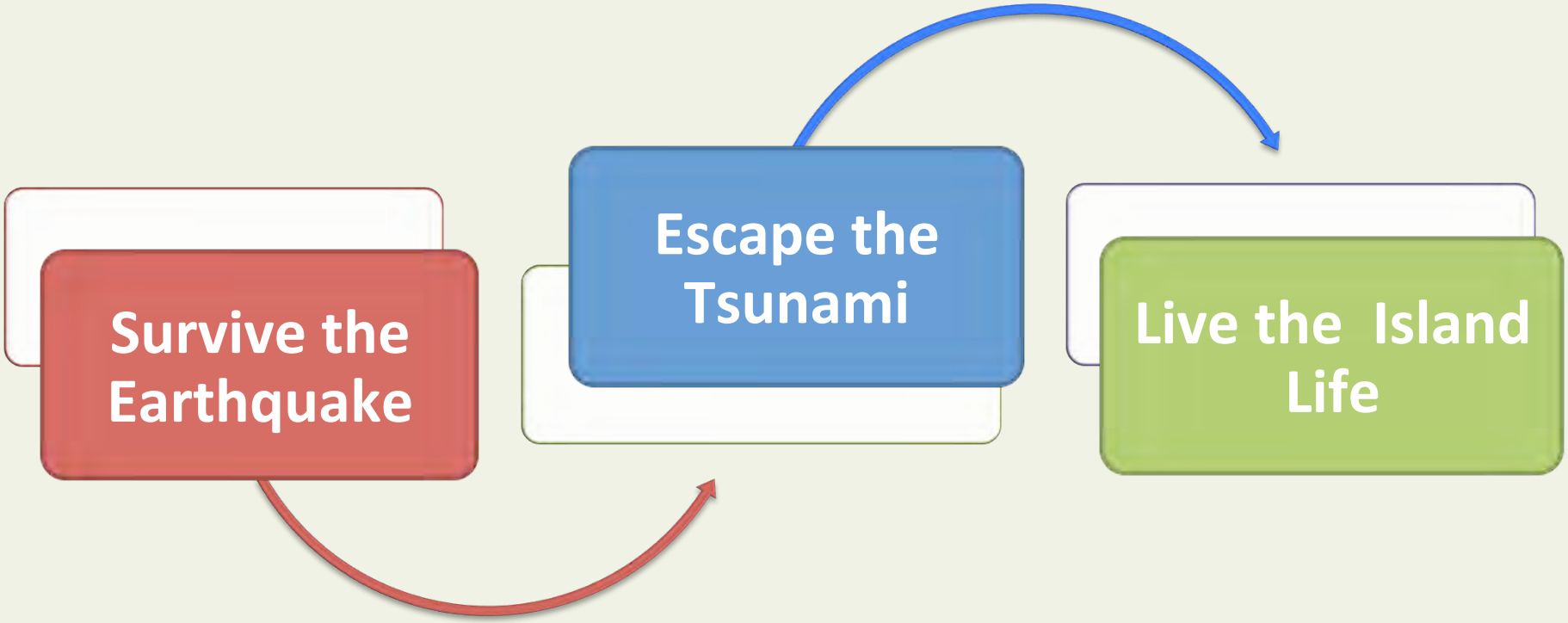
Cascadia Preparedness:

Preparedness for Post-Event Personal and Community Survival

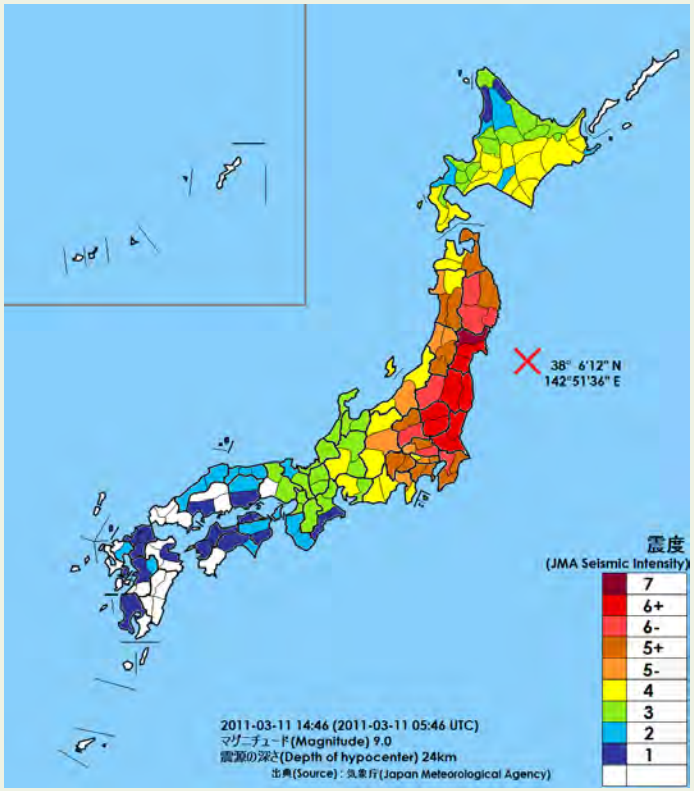
Cascadia EarthScope Earthquake & Tsunami Education Program

Althea Rizzo~October 2013

Local Cascadia Event



March 11, 2011
Tohoku-oki Earthquake and Tsunami



Know your hazard
Probability versus Possibility

- Planning assumptions led to inadequate mitigation
  - (Probable) Response planning was based on a recurrence of the 1896 Meiji Sanriku or 1960 Chile tsunamis.
  - (Possible) 869 Jogan earthquake and tsunami
    - significantly larger
    - viewed as an “outlier,” a 1,000-year event that was low probability.
    - The planning scenario supposedly depicted a high-probability “100 year event.”

Assumptions have human impact

- 22,600 persons killed or missing nationwide
  - 15,500 confirmed deaths
  - 92.4% drowning
- 107,000 buildings collapsed, and another 111,000 partially collapsed

- BUT ….
  - 6.5 million people live within 200 miles of rupture zone

Initial earthquake magnitude estimations feeds previous assumptions

- Earthquake initially estimated at 7.9M
- Tsunami warnings issued based on this false information
- Subsequently, magnitude was raised to 8.9, then 9.0
- Earthquake damage caused power and telecommunication outages which prevented people from getting updated tsunami warnings

Factors affecting survival of tsunami

- Physical factors
  - geography and topography
  - distance to high ground
  - pre-disaster land use

Factors affecting survival of tsunami

- Human factors
  - time of the event
  - limited mobility
  - caregiv-ing behavior
  - inaccurate conclusions drawn from past tsunami experiences
  - instinct to protect property

Survival factors: disaster preparedness

- Regularly practiced drills
- Saw other people evacuating

Prepare your community …

Recommendations

- Enhance tsunami evacuation routes where high ground available
  - Harden infrastructure
  - Clear wayfinding
  - Practice, practice, practice
- Build vertical evacuation refuges where high ground is not available.

Embed tsunami information in ambient built environment

R. Wilson

Japanese emergency response challenges.

- Scale of the tsunami disaster
- Infrastructure damage prevented early reporting of damage and response needs.
- Access to satellite telephones was limited and inadequate to fill the communications gap.
- Highway and rail lines along the coast were destroyed, and access from the major highways to the west was blocked in many places by road damage and landslides.
- Marine access from the Pacific Ocean side of Iwate, Miyagi, and Fukushima prefectures was blocked on the first day by continuing tsunami action, and later by damaged dock facilities and floating debris.
- Fuel for vehicles and equipment was not available due to loss of power and damage to facilities.

Responders as victims

- Many jurisdictions lost political and response personnel,
  - Facilities destroyed.

Otsuchi

Lost mayor, seven senior staff, and 31 other municipal employees in the tsunami.

Minamis-anriku

Emergency operations and tsunami warning center was destroyed. 10 staff members survived by clinging to antennas on the roof.

Recommendations: Ensure Critical Continuity

- Relocate critical facilities out of inundation zone
- Retrofit critical facilities
- Prohibit building new critical facilities in inundations zone
- Ensure future construction of critical facilities meet the most robust standards

Emergency Shelter and Housing

- About 470,000 evacuees required shelter
- Local governments are responsible for post-disaster care and sheltering with assistance provided by the national government

Challenges to sheltering

- Depen-dent on local government officials, undamaged facilities, and logistic support.
- Pre-designated shelters destroyed.
- In some areas, food and water were not delivered for up to three days.
- Sheltering - mix of planned and ad hoc

In-place sheltering

- People with places to stay with family or friends or staying in their own homes
- Barrier to information and services as those living in shelters.
- Impacted lifeline services and other amenities

Recommendations

- Robust sheltering planning
- Bring the message home
  - Personal preparedness
  - Neighborhood prep
  - Community prep

Cascadia Planning Assumption

- Widely accepted that a very large, 9+ subduction zone earthquake is not just possible, but probable
- Three metropolitan cities in impact zone
  - Portland
  - Seattle
  - Vancouver, B.C.
- Heavy urbanization along the I-5 corridor
- Approximately 9.5 million people live in the hazard zone in WA & OR

What are the Implications?

Aftershocks

Injuries

Hypothermia

- Hypothermia is a significant risk
- Rainy Coastal Environment

2011 Japan Tsunami

Buildings Destroyed

Fires

Harbors Destroyed

Aircraft & Airports Destroyed

Hazardous Materials

Debris

Roads Destroyed or Blocked

Injuries & Death

Rescues

Islands

Separated by…

- Failed Bridges
- Landslides
- Debris
- Hazardous Materials

Broken Communication

New Tidal Level

Strengthen Your Community

- Map Your Neighborhood
- Cache of Supplies
  - Neighborhood Caches
  - School Caches
- Vertical Evacuation Options
- Drills
- Seismic Strengthening

Build Response Capacity

- Community Emergency Response Team
- Red Cross
  - Shelter Ops & Management
  - First Aid
- Amateur Radio Operator
- Post-Earthquake Building Evaluations
- Animals in Disasters

Oregon is at risk from an earthquake and tsunami that can significantly impact our people and economy for decades.

What Oregon is doing

House Resolution 3, adopted in April 2011, directed the Oregon Seismic Safety Policy Advisory Commission (OSSPAC)

> "to lead and coordinate preparation of an Oregon Resilience Plan that reviews policy options, summarizes relevant reports and studies by state agencies, and makes recommendations on policy direction to protect lives and keep commerce flowing during and after a Cascadia earthquake and tsunami."

OSSPAC assembled eight task groups

- volunteer subject-matter experts from government, universities, the private sector, and the general public.

An Advisory Group of public- and private-sector leaders oversaw the Task Groups' work, assembled in the portfolio of chapters that make up the plan.

The Oregon Resilience Plan:
Reducing Risk and Improving Recovery for the Next Cascadia Earthquake and Tsunami

- Report to the 77th Legislative Assembly from Oregon Seismic Safety Policy Advisory Commission (OSSPAC)
- February 2013
- http://www.oregon.gov/OMD/OEM/osspac/docs/Oregon_Resilience_Plan_Final.pdf

Key Findings

- Casualties (1,250 to more than 10,000)
- Economic Loss (close to 20% state GDP)
- More than one million truck loads of debris

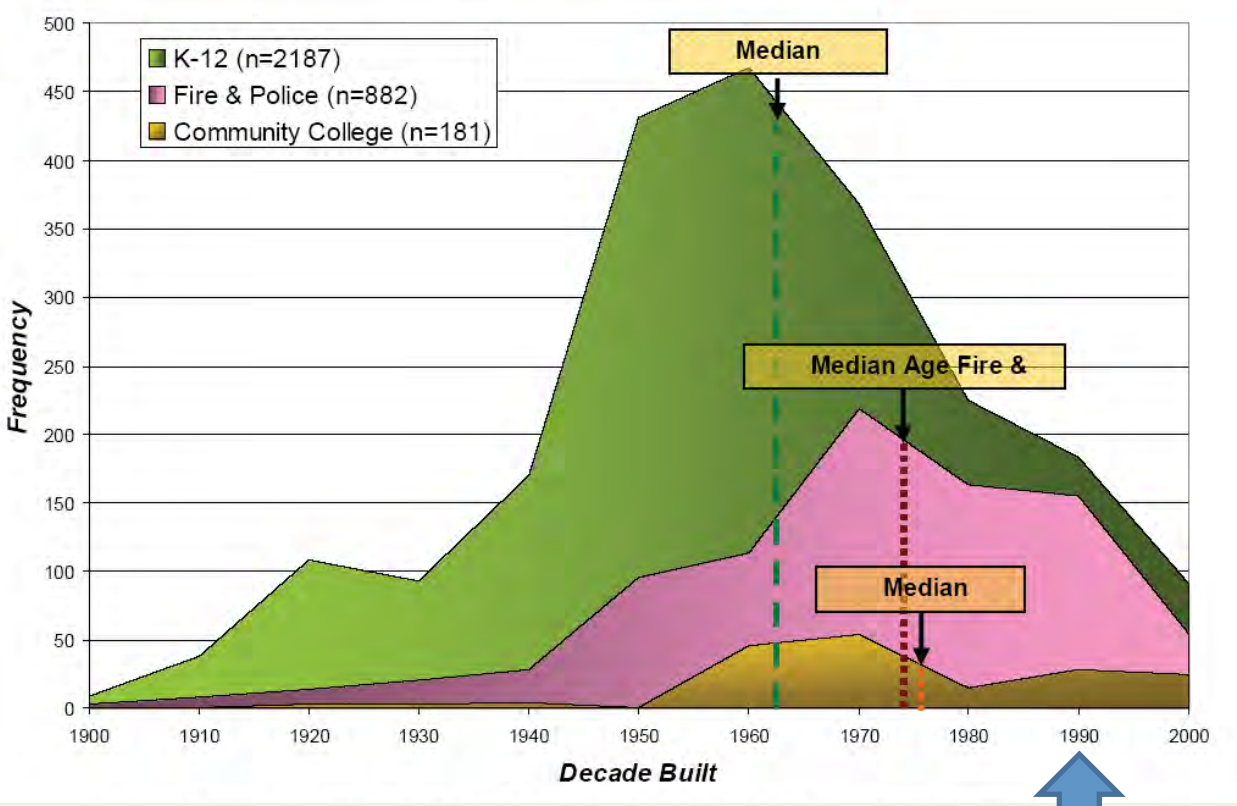
Liquid fuel vulnerability

How much liquid fuel does **your agency** use in **one month?**

Timeframes for service recovery under present conditions:

Critical Service	Zone	Estimated Time to Restore
Electricity	Valley	1 to 3 months
Electricity	Coast	3 to 6 months
Police and fire stations	Valley	2 to 4 months
Drinking water and sewer	Valley	1 month to 1 year
Drinking water and sewer	Coast	1 to 3 years
Top-priority highways (partial restoration)	Valley	6 to 12 months
Healthcare facilities	Valley	18 months
Healthcare facilities	Coast	3 years

Impact of Cascadia on our aging Oregon Education & Emergency Facilities



First seismic building codes in Oregon

Key recommendations

- Complete an inventory
  - **Critical buildings**
  - **Agency, transit, port, and rail assets**
  - **Energy and information and communications sectors**
  - **Water and wastewater**

Key recommendations

- Sustained **program of capital investment** in Oregon's public structures, including
  - Fully funding **Oregon's Seismic Rehabilitation Grants Program** for K-12 schools, community colleges, and emergency response facilities
  - Seismically **upgrading lifeline transportation routes** into and out of major business centers statewide by 2030

Key recommendations

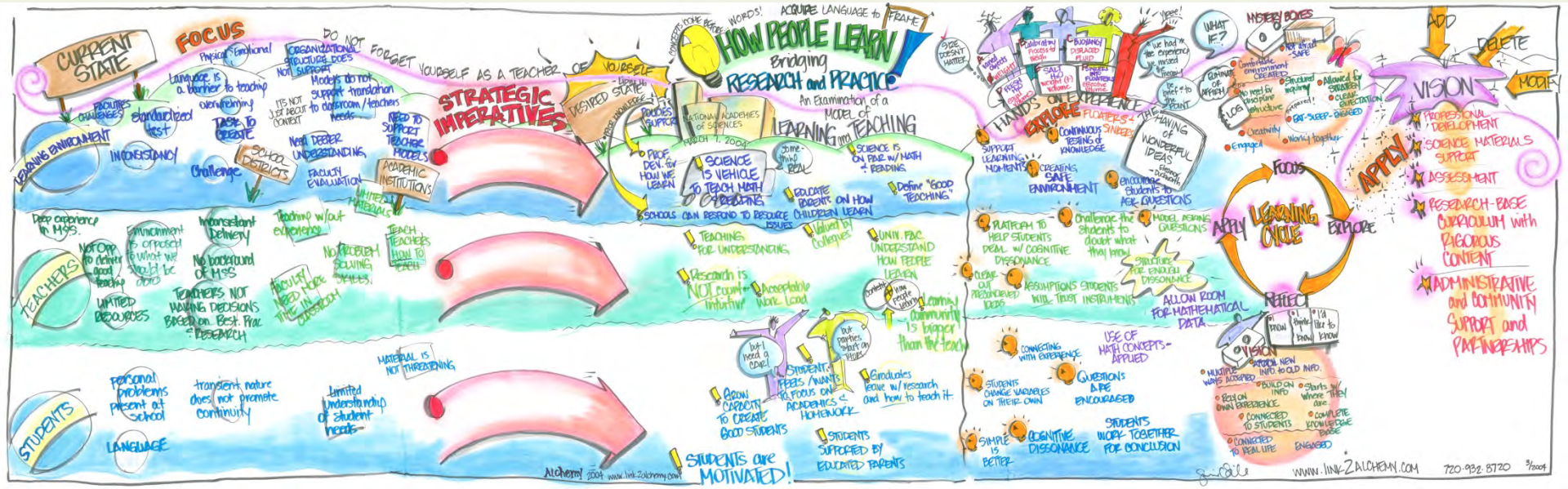
- Craft a **package of incentives** to engage Oregon's private sector
  - **Seismic rating system for new buildings**
  - **Seismic preparedness of the energy providers**
  - Plans to **assist visitors**

Key recommendations

- **Update Oregon's public policies**
  - I**ndividual preparedness communications** to specify preparation from the old standard of 72 hours to a minimum of two weeks, and possibly more
  - Developing a policy and standards for installation of **temporary bridges** following earthquake disruption

Senate Bill 33

- Tasks the Resilience plan workgroup to develop an implementation plan
- Report due to Oregon State Legislature
  - **October 1, 2014**



Resiliency CAN be achieved

- After the February 27, 2010 M8.8 Maule Earthquake, Chile was able to restore 90% communication services and 95% power supply within two weeks, and re-start commercial flights after ten days.
- After the March 11, 2011 M9.0 Tohoku Earthquake, Japan was able to restore more than 90% power supply in ten days, 90% telephone lines in two weeks, and 90% cellular base stations in 19 days.

You can't prevent an Earthquake, but you can prepare for one

Building a culture of prevention is not easy because the cost of prevention has to be paid in the present, while its benefits lie in the distant future. Moreover, the benefits are not tangible; they are the disasters that did not happen. *(to paraphrase Kofi Annan)*

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