Disaster Epidemiology: the evolution of emergency preparedness in public health

WREN, May 15, 2008

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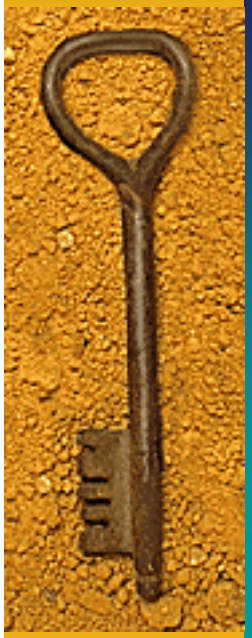
Oregon Public Health Division

Office of Environmental Public Health



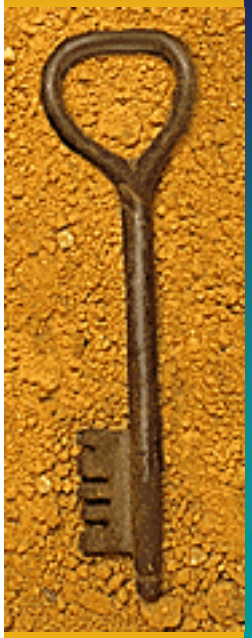
Presentation Overview

- Disaster Epidemiology
- Public Health Hazard Vulnerability Assessment (PH-HVA)
- Geographic Information Systems (GIS)

The Problem

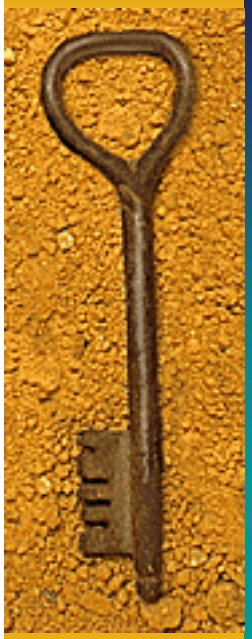
Leadership at the highest levels has gotten it wrong when it comes to emergency preparedness

Politics of fear has driven planning & funding



Goals for Disaster Epidemiology

- Gather better data about impacts from disasters/emergencies
- Characterize what happened to whom, how, why…..
- Apply findings to improve planning



Web-based Data System – Interviewer Driven system

Post Disaster Registration System

Demographics | Emergency Contact | Exposure Details | Screening/Labs | Clinical/Follow-up | Administration | Find

Bobdonovich (Last Name) Ray (First Name) (MI)

Birthdate

If birthdate not available, enter age below

Age

○ Female ○ Male

If female, pregnant? ○ Yes ○ No

if female, nursing? ○ Yes ○ No

Race ☐ White ☐ Black ☐ Pacific Islander ☐ Asian ☐ American/Alaskan Native

Hispanic ○ Yes ○ No

Speaks English? ○ Yes ○ No ○ Unk

other language

Contact Information

7/26/2000 Date of Contact Info

11016 NW 01st (Address)

541-981-2441 (Phone)

How many people live in this household?

Submit

Contact Type (home/work)

Boardman (City) OR (State) 97818 (Zip)

(Email)

Who provided information on the registrant?

Identification provided (specify type and number):

State ID 11016

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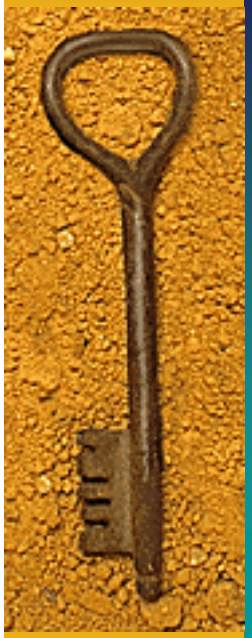

Web-based Data System – Interviewer Driven system

Post Disaster Registration System

Demographics | Emergency Contact | Exposure Details | Screening/Labs | Clinical/Follow-up | Administration

Date of Info

Contact Type (home/work)

(Phone)

(Email)

(Last Name)

(Address)

Lives in the same household

Submit

(First Name)

(MI)

(City)

(State)

(Zip)

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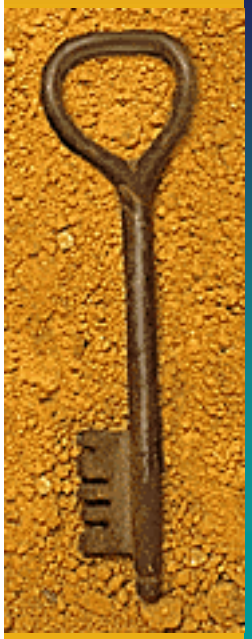

Web-based Data System – Interviewer Driven system

Post Disaster Registration System

Demographics | Emergency Contact | Exposure Details | Screening/Labs | Clinical/Follow-up | Administration

Where was this person exposed? (be specific: landmarks, mileposts, etc.)

Reason for being at this location?

Physical location at time of exposure (e.g., inside a car, in a building)

Time at exposure zone

Duration in exposure zone

Based on this information and the description of the plume select the appropriate exposure zone

Contamination/De-con

Contaminated ○Yes ○No ○Unk

Contamination Monitor

Decontaminated ○Yes ○No ○Unk

If yes, where?

Post Exposure

Post exposure instructions

Post exposure location (where did victim go?)

Post exposure behavior (what did victim do?)

Notes

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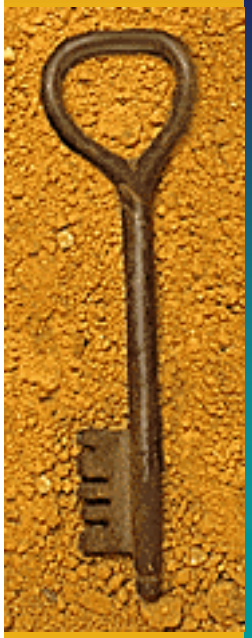

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Post Disaster Registration System

Demographics | Emergency Contact | Exposure Details | Screening/Labs | Clinical/Follow-up | Administration

Spec Date	Specimen #	Lab Name	Spec Type	Test Type	Result

OSPHL Data

Spec Date	Specimen #	Lab Name	Spec Type	Test Type	Result

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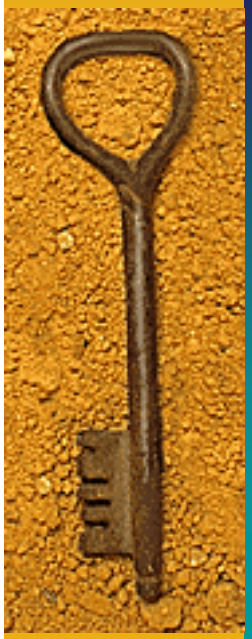

Web-based Data System – Interviewer Driven system

Post Disaster Registration System

Demographics | Emergency Contact | Exposure Details | Screening/Labs | Clinical/Follow-up | Administration

Clinical Info

Triage Status

Hospitalized (or clinic or urgent care) ○ Yes ○ No ○ Unk

Specify location:

Preexisting conditions ○ Yes ○ No ○ Unk

Specify

Signs/Symptoms

Injuries sustained from exposure

Symptoms resulting from the exposure

Other clinical signs of exposure

Supporting Documentation (electronic files)

Cannot append supporting documentation over the web.

Follow up information (Questions to be defined at a later date)

(Date of follow-up)

Q1 Q2 Q3 Q4 Q5 Q6 Q7 Q8 Q9 Q10

Notes

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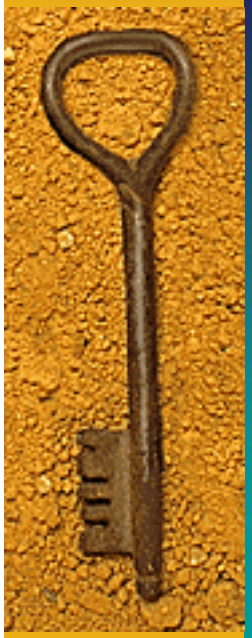
Exit

Web-based Data System – Interviewer Driven system



Post Disaster Registration System

Demographics | Emergency Contact | Exposure Details | Screening/Labs | Clinical/Follow-up | Administration

Who collected/provided initial information?

How was initial information provided?

Where was initial information collected?

Initial information collection date?

Export functionality does not work over the web.

Export Data

County MORROW

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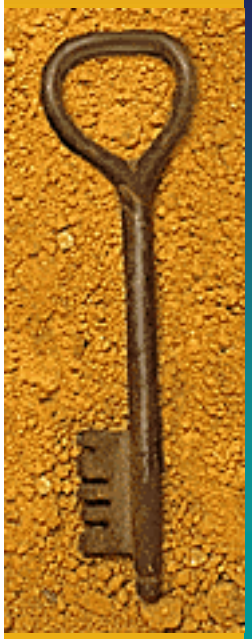


Web-based Data System –Self registration

Post Disaster Registration System

(Last Name) (First Name) (MI)

Birthdate ○Female ○Male If female, are you pregnant? ○Yes ○No

Contact Information

(Address) (Phone) How many people live in this household?

(City) (State) (Zip) (Email)

Exposure Details

Where do you think you were exposed? (be specific: landmarks, mileposts, etc.)

Why were you there?

Exactly where were you? (e.g., inside a car, in a building)

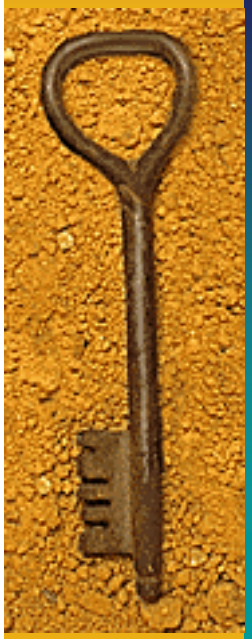
What time were you there? How long were you there?

Where did you go from there?

What did you do after you left the area?

Additional Comments:

Submit & Exit Exit



An Emergency Management Approach to Disasters

- Defined by a community's ability to deal with hazards (severe weather, dam failures, mass casualty incidents, etc)
- Result in large scale disruptions that can impact all sectors of a community
- Can be acute (rapid onset) or chronic (result of slower changes over time)

An Integrated Emergency Management Approach

Hazard Identification & Risk Assessment

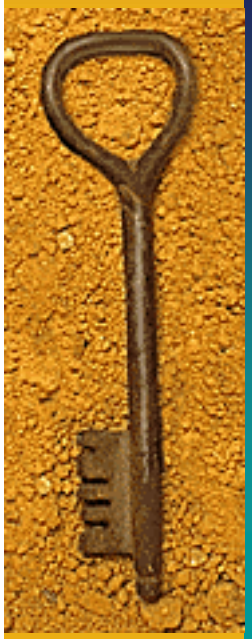
Vulnerability Analysis = **Set Priorities**

Mitigation/Prevention Strategies = **Reduce Impact**

If Hazard Remains = **Get Ready, Go**

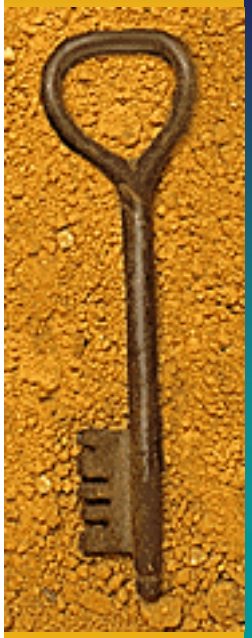
Preparedness	Contingency	Effective	Fast
Education	Planning	Response	Recovery

FEEDBACK



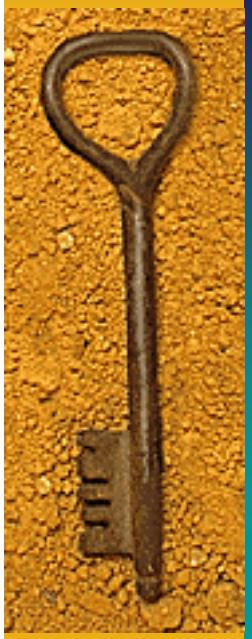
Hazard Vulnerability Assessment (HVA)

- The systematic identification of potential hazards in the community
- Identifies vulnerabilities & resources
- Foundation to prioritize hazards, potential losses
- Enables communities to plan & establish appropriate preparedness measures
  - Funding needs, programming, linkages, etc.

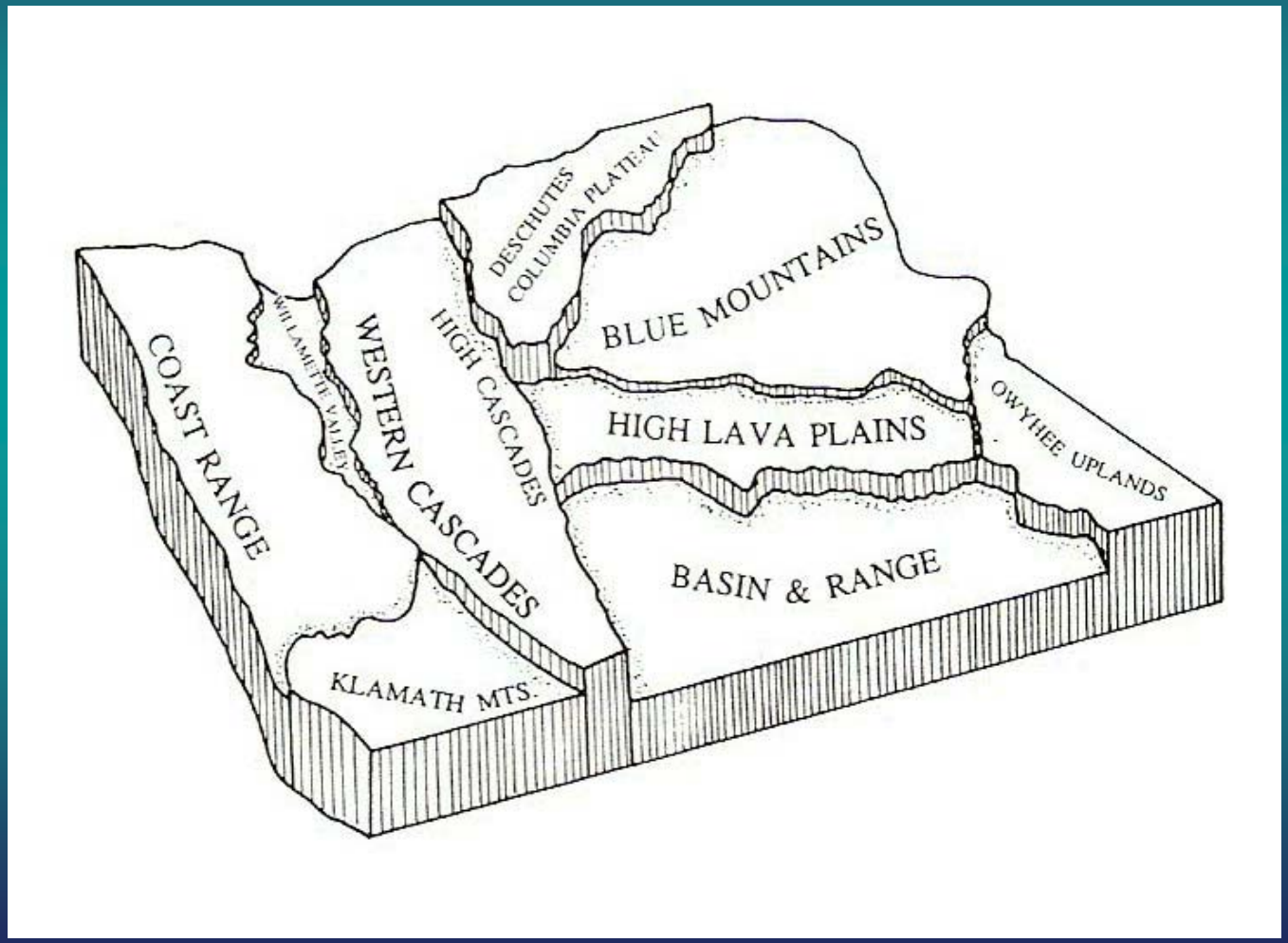


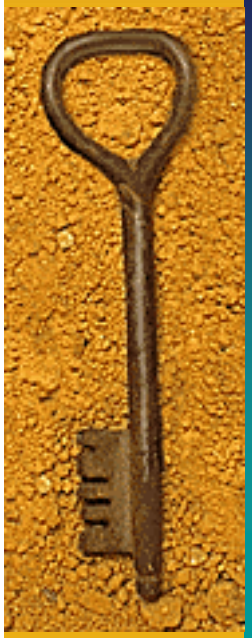
HVA

- Uses quantitative & qualitative hazard analysis (standardized approach)
  - What?, How often in the past? How large? How likely in the future?....
- Measures vulnerability as risks to people, function of society, critical infrastructure (both business & government services)



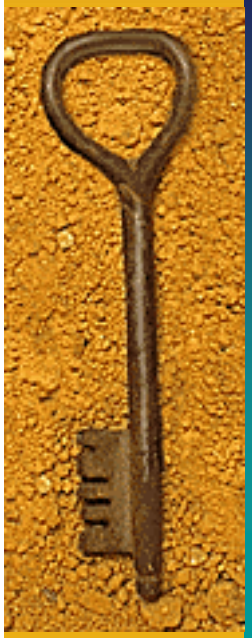
HVA -- different risks and hazards





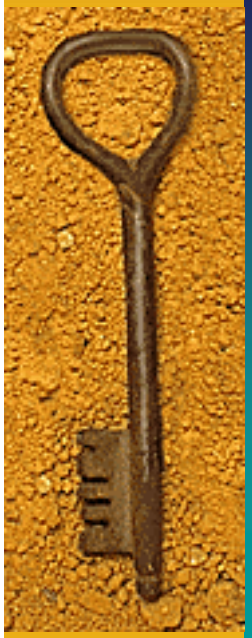
HVA

- Identify the hazards in a specific jurisdiction (County, City, Region)
  1. Natural Events
  2. Technological Events
  3. Human Events



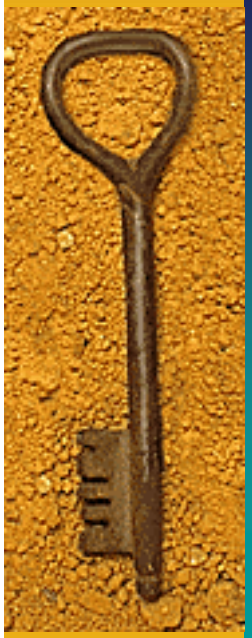
Vulnerability Assessment Hazard Analysis Matrix

Natural Hazards	History X2	Vulnerability X5	Maximum Threat X10	Probability X7	Total	Severity Rating
Pandemic Influenza						
Category A Biological Agents						
Biological Agents – water supply disruption						
Drought						
Wildland Fire						
Urban Fire						
Avalanche						
Snow / Ice / Hail						
Tsunami						



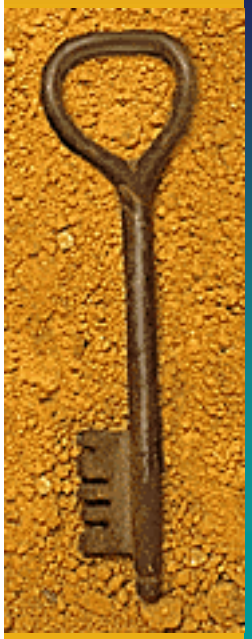
Hazard Types

Natural Hazards	Technological Hazards		Human Events
Wind Storm	Hazardous Material Release	Data / Computer Disruptions	Terrorism – CBRNE
Extreme Heat / Cold	Mass Casualty Incident	Structural Collapse	Sabotage
Flood	Radiological Accident	Dam / Levee Failure	Civil Unrest
Earthquake (significant – 6.0 or greater)	Telecommunications Disruption		Special Events
Landslide / Mudslide	Electric		Influx of Evacuees
Volcanic eruption	Natural Gas / Propane		
Tornado	Water / Sewer Disruption		
Dust / Sandstorm	Utility Failure		
Lightning storm	Fuel Shortage		



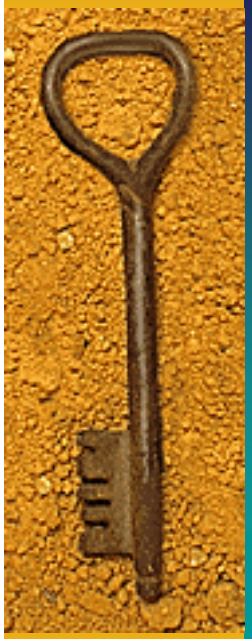
HVA

- All communities have done some risk assessment (by Emergency Management)
- Public health impacts may not always be considered, and public health professionals may not be engaged in the process



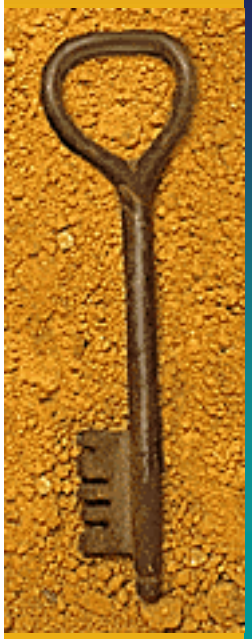
Public Health HVA

- How disasters impact the public's health
  - Threats to human health -- illness, injury, or death
  - Disruption of healthcare infrastructure
  - Impacts on communities of people & social order
  - Psychological stress
  - Changes in the environment & disruption of public health services (e.g. food, water, etc.)



Public Health HVA

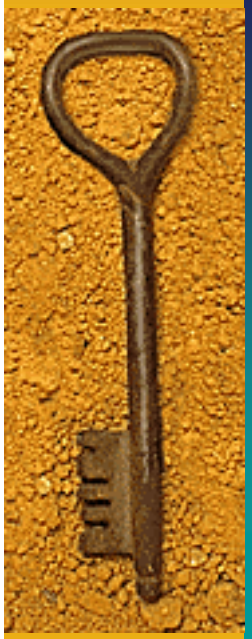
- Public health must prepare for these threats from the perspective of ESF 8 responsibilities
- Public health needs to develop infrastructures
  - All hazards approach
  - Anticipate, plan, recognize, respond
- Public health needs to develop/strengthen partnerships to coordinate efforts



Public Health HVA

Goal to minimize the impact of emergencies

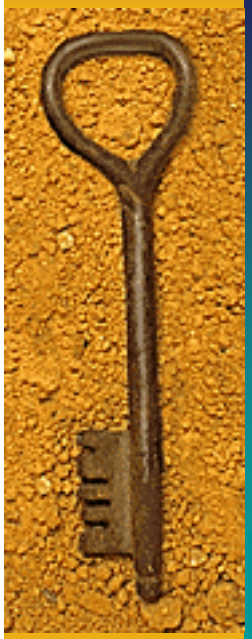
- Disaster impact is distributed unevenly in our communities
  - Not everyone has the same ability to react to risks they face
    - Social, health, psychosocial, economic, language, cultural, physical ability, age
- We can know about the differences in risk among these groups in our communities



Public Health HVA

Planning/Prevention/Mitigation

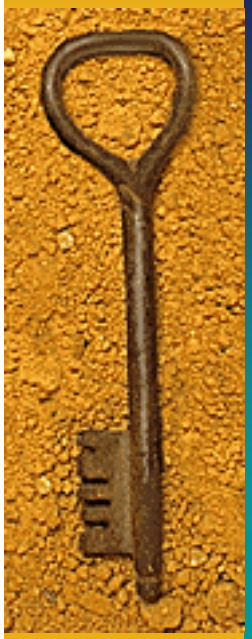
- Identify top public health disasters
  - Threats to the health of people
  - Impacts to the healthcare system
  - Changes in the environment
- Identify populations most likely to be negatively impacted by each disaster



Public Health HVA

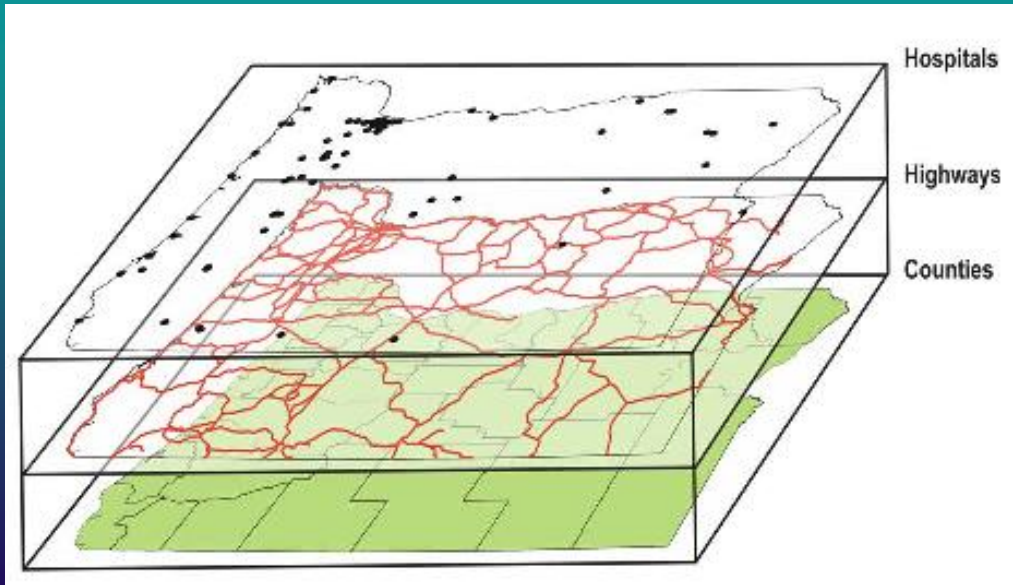
Geographic Information Systems (GIS)

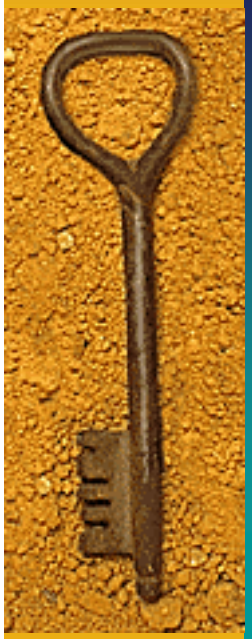
- An important tool to visualize the distribution of:
  - Populations at risk
  - Sources of hazards in the community
  - Resources available to assist mitigation & prevention
- New tools make use of GIS easier & more accessible



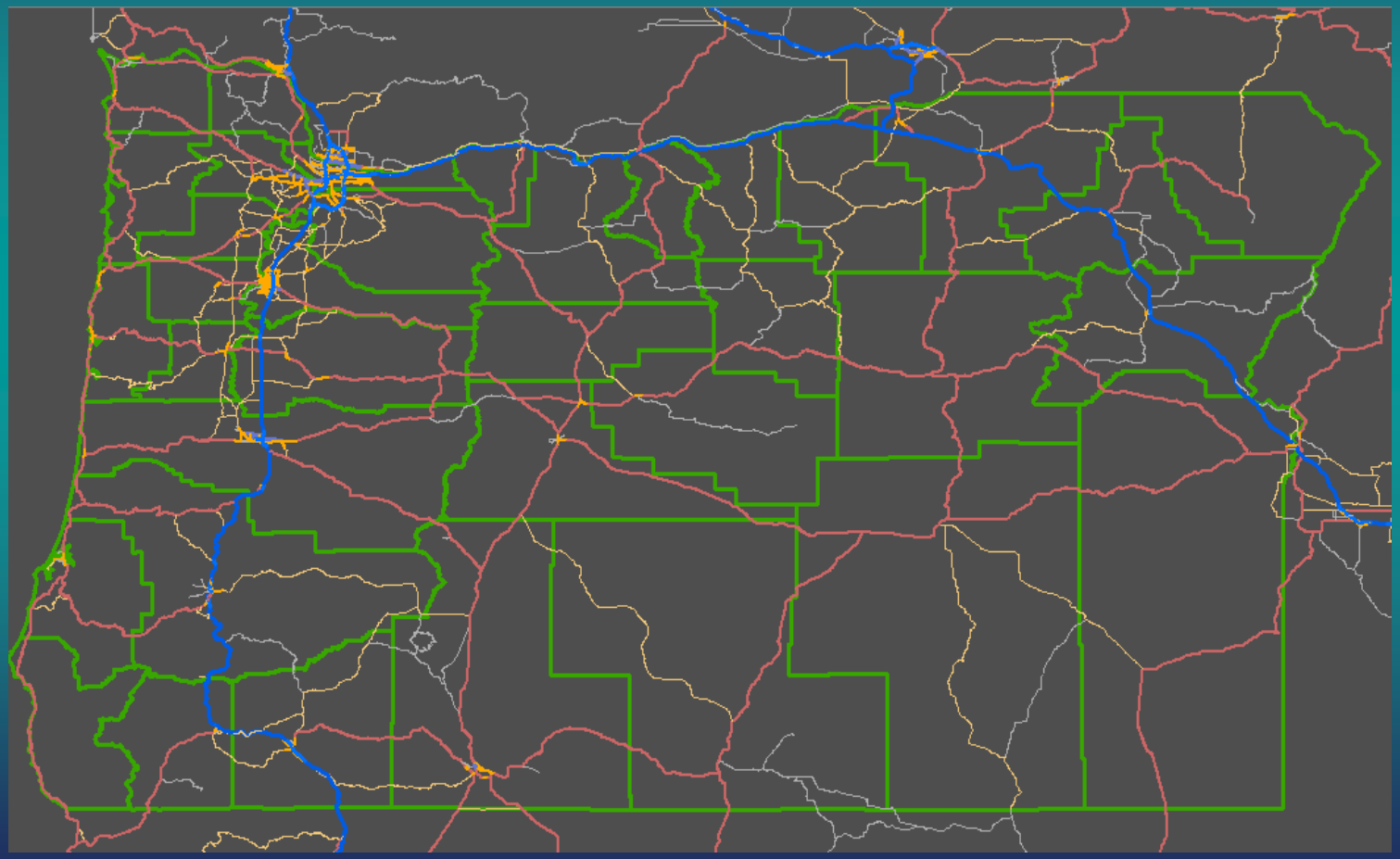
Geographic Information Systems

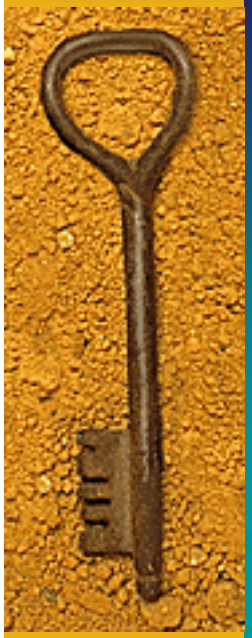
A tool for understanding the spatial association between hazards, populations & facilities at risk





Geographic Information Systems – Geocoding





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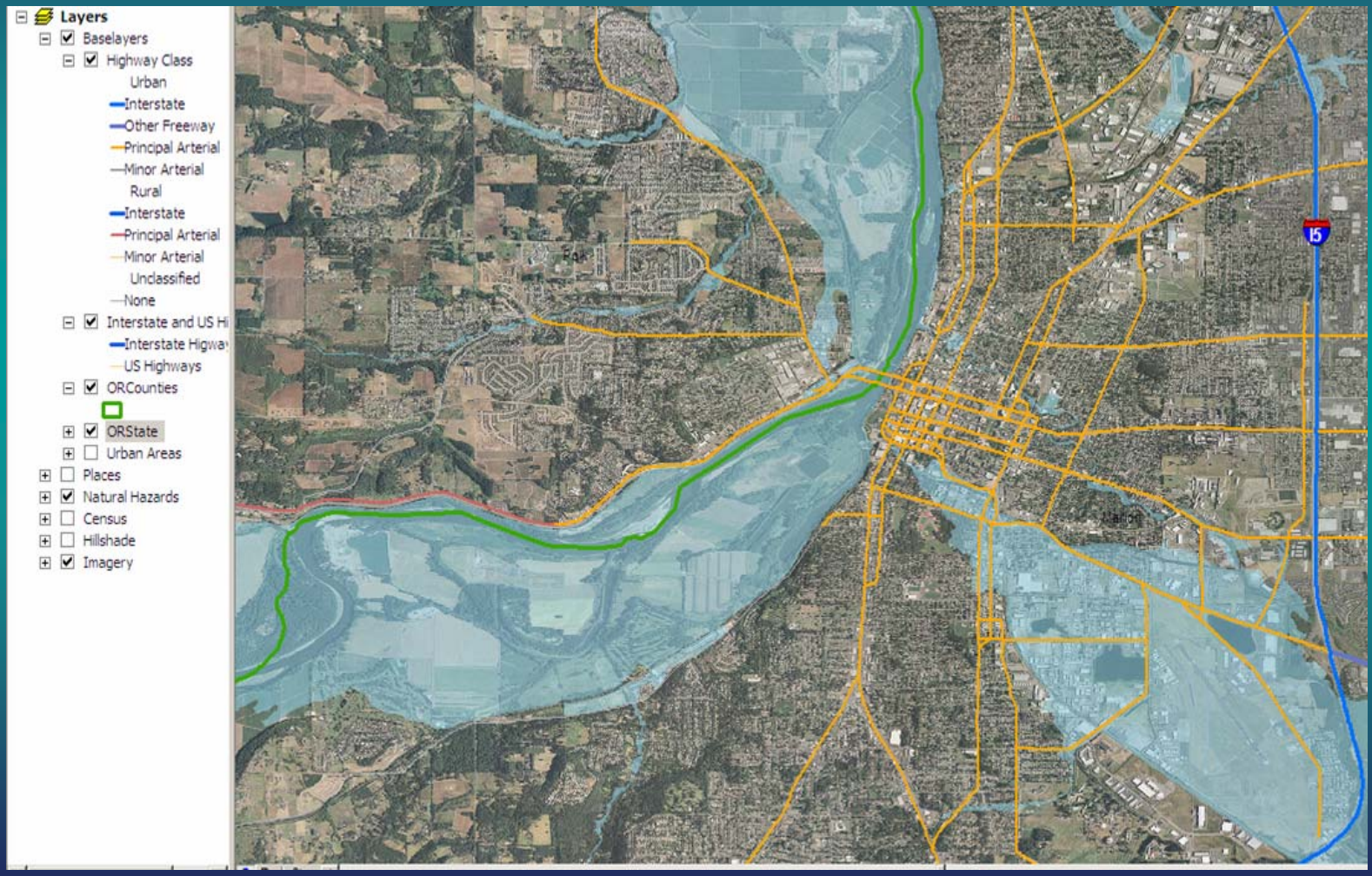

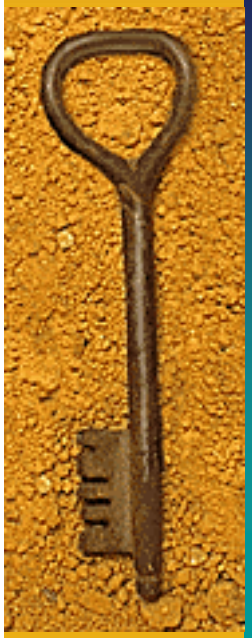

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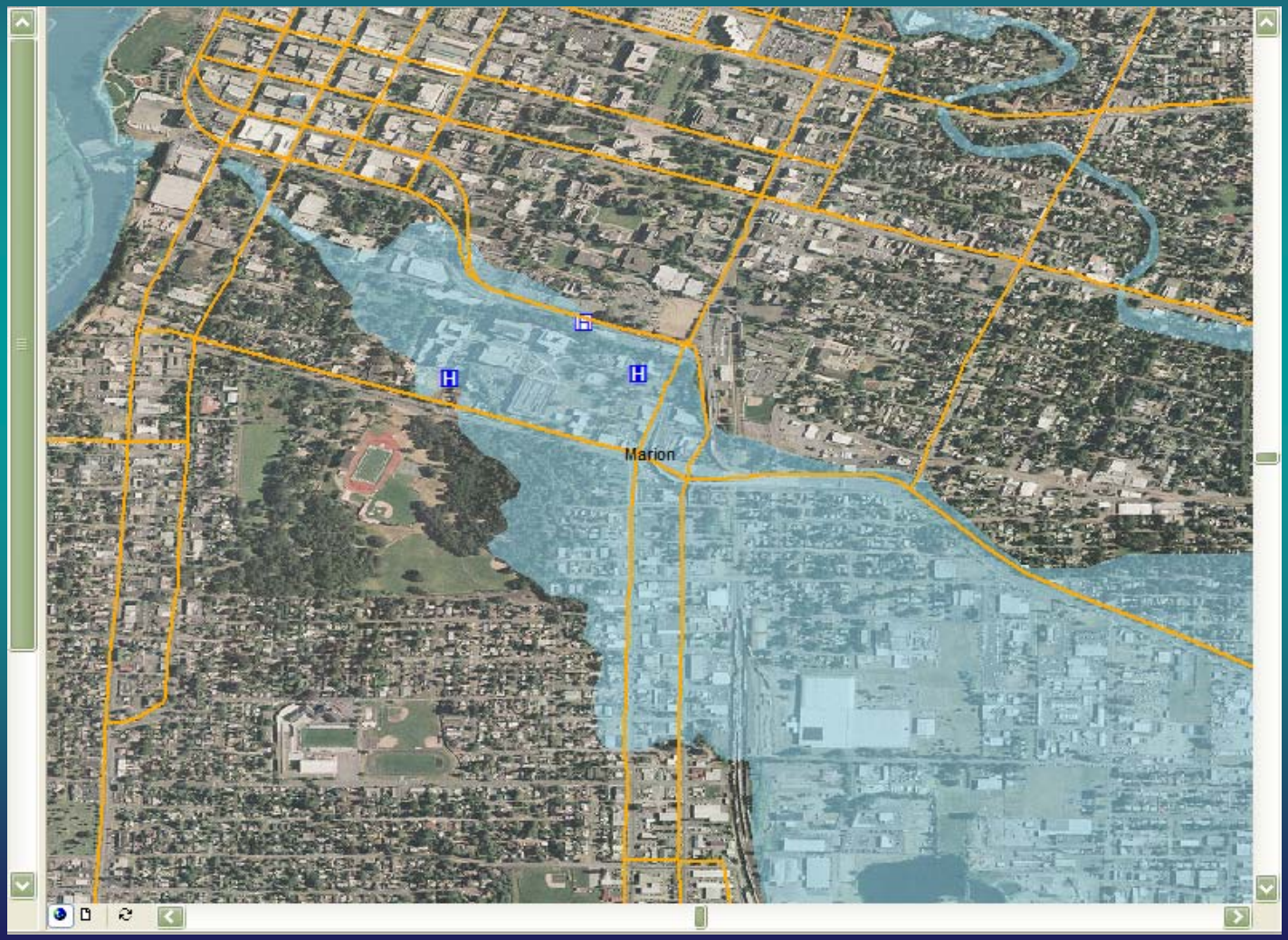
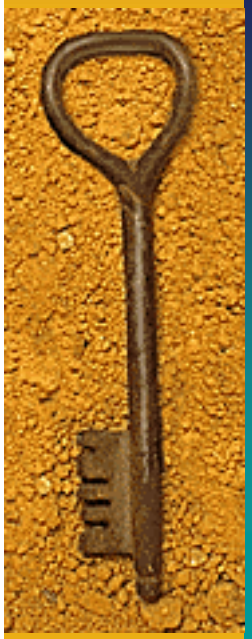
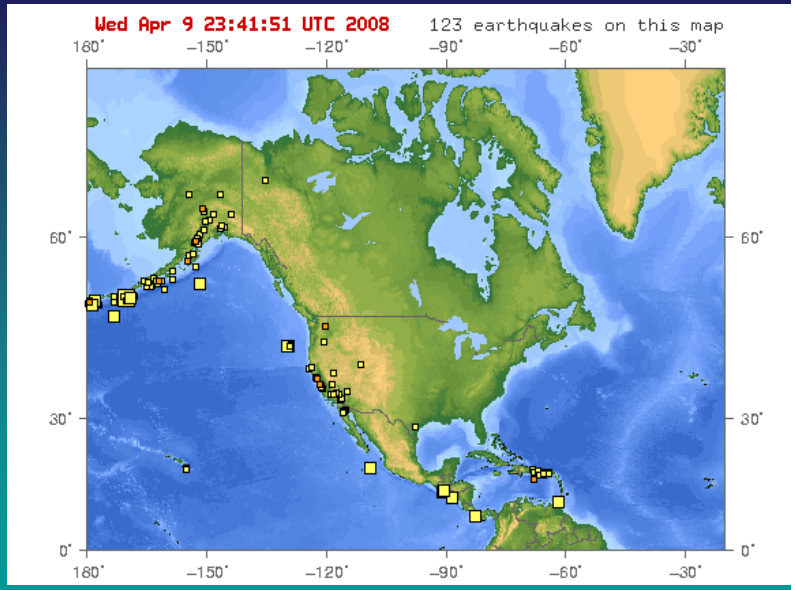
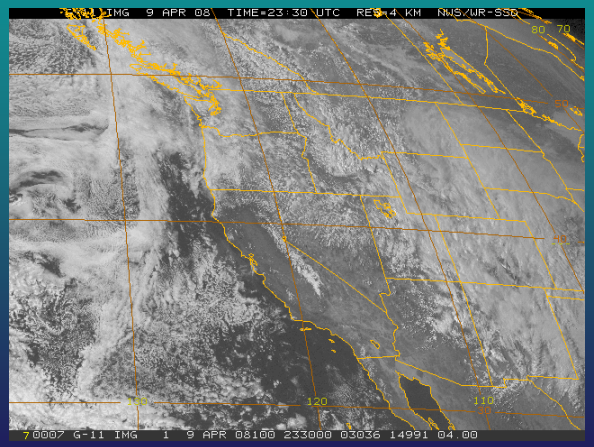


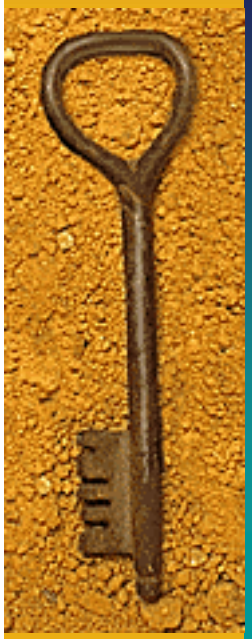


Hazard Data Sources



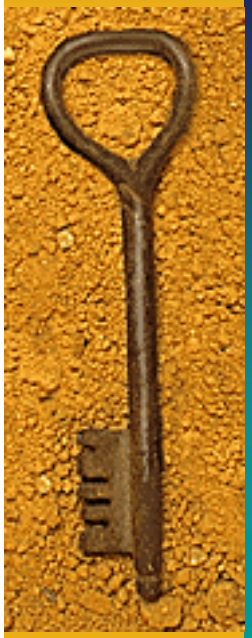
- FEMA
- USGS
- NOAA
- EPA
- Right-To-Know Network
- ATSDR (Agency for Toxic Substances & Disease Registry)
- NGA (National Geospatial-Intelligence Agency)
- Pacific Disaster Center
- US DOT
- Others





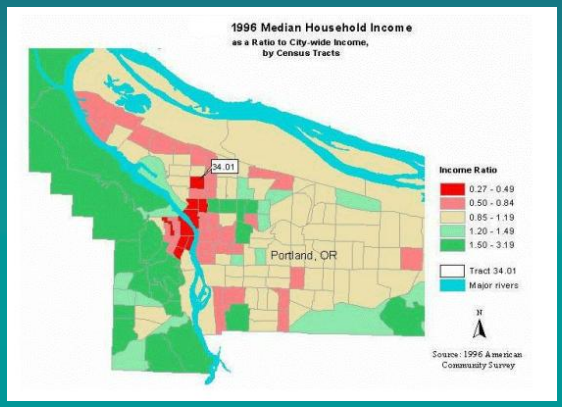
Population Vulnerability Dimensions

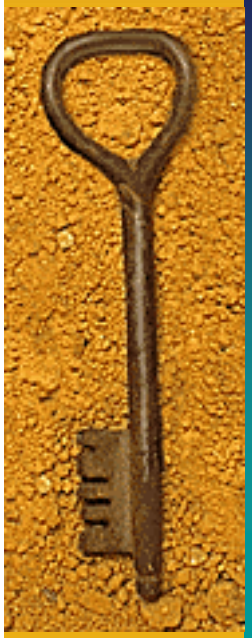
- Economic
- Social
- Demographic
- Political
- Psychological



Vulnerable Populations

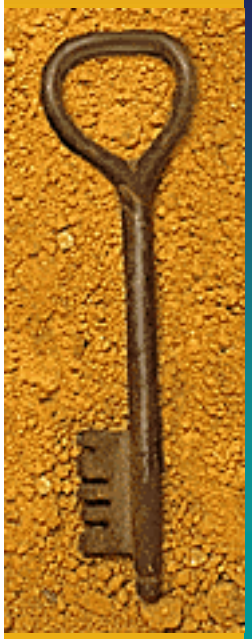
- Age
- Race / Ethnicity
- Occupation
- Personal wealth
- Housing
- Building density
- Single-sector economic dependence
- Infrastructure dependence
- People with disabilities





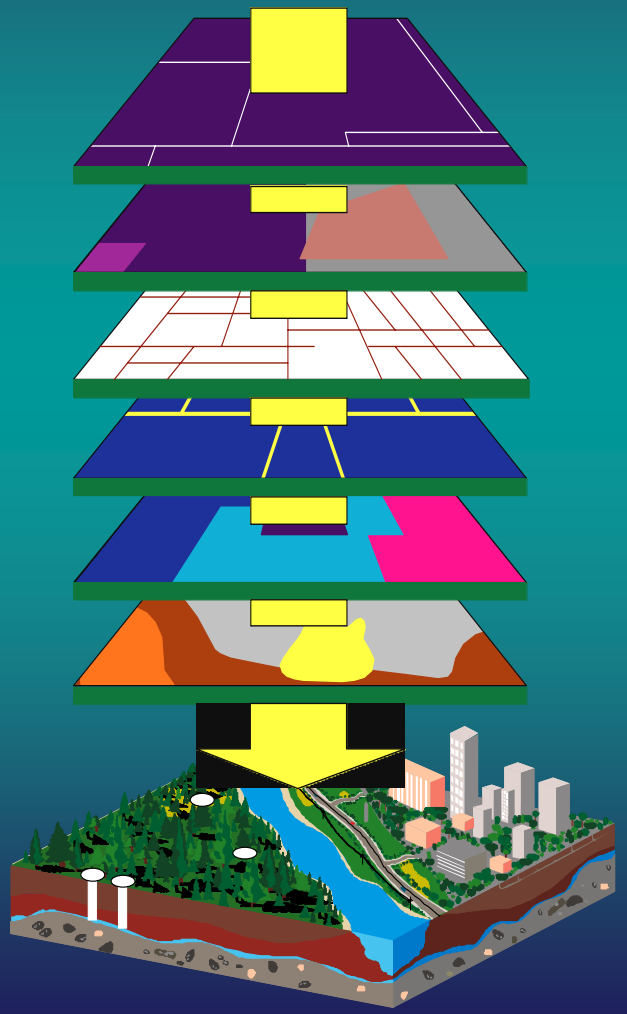
Other Population Dynamics

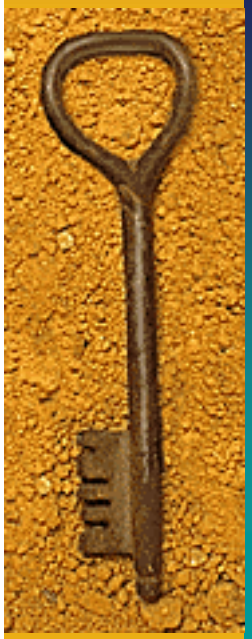
- Residential population
- Location of businesses / number of employees
- Location of schools / enrollment
- Temporary populations
- Location of shopping centers, sports arenas, etc.



Critical Facilities & Infrastructure

- Government
  - Police/Fire/Institutions
- Schools
- Places of worship
- Medical facilities
  - Hospitals/clinics

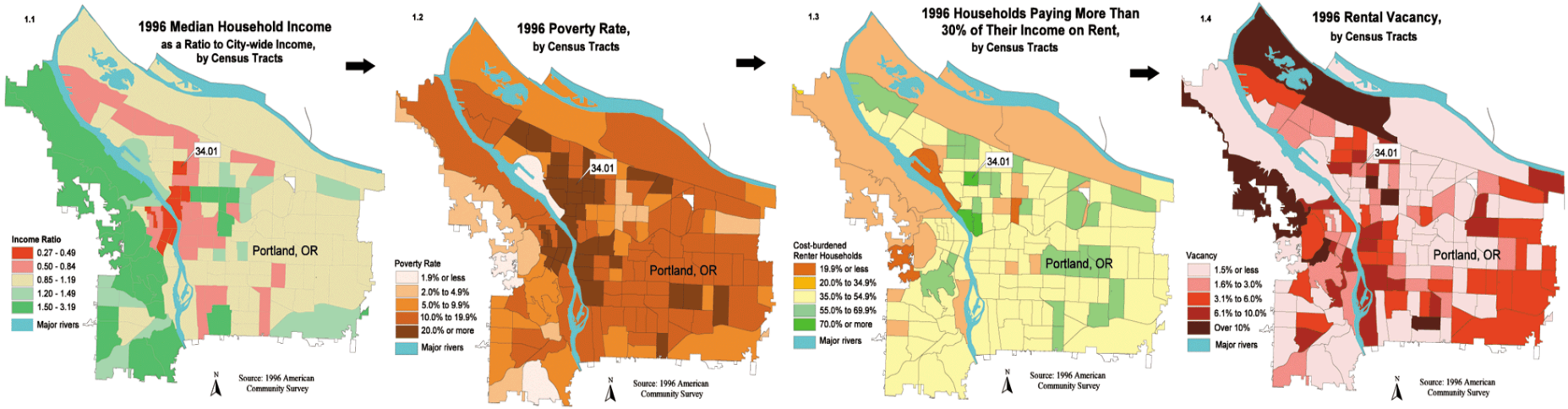


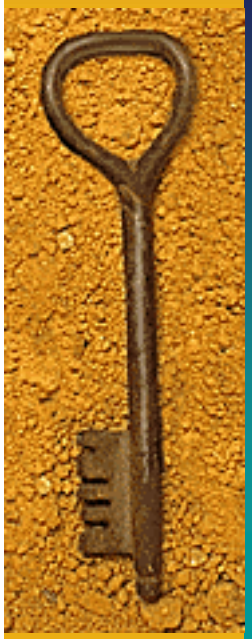


Population & Facilities Data Sources

- U.S. Census
- County & Local Government
- Commercial Vendors
- Other sources

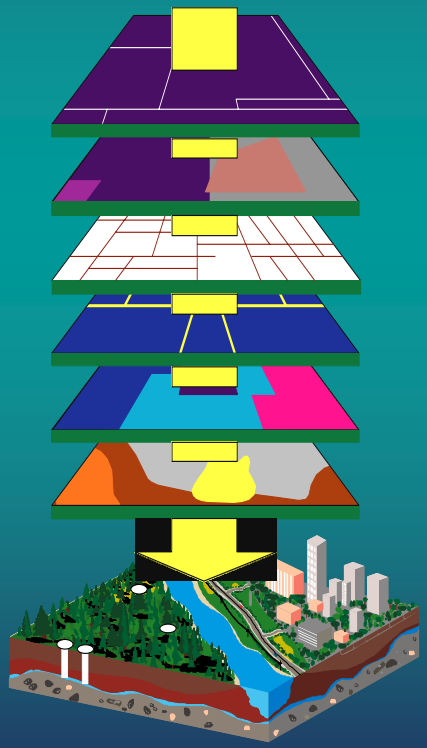
1. Analysis conducted using data from the 1996 ACS: Figures 1.1 - 1.4 show the spatial distribution of variables included in the study. Tract 34.01 is compared with other Census tracts in Portland, OR.

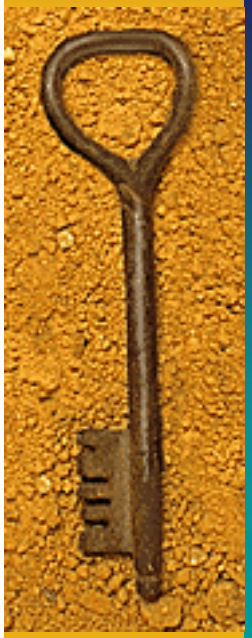




GIS Tools/Resources

- CDC Human Vulnerability MapBook
- ArcGIS
- ArcExplorer
- ArcReader
- Others





Contact Information

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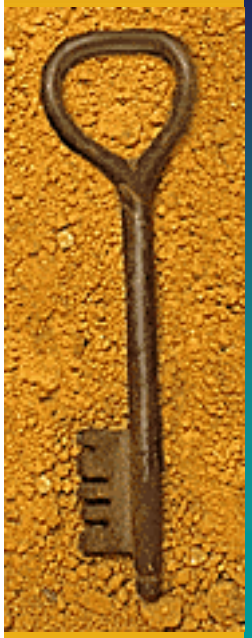
971-673-0538



Comments/Questions

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