

RIESGOS

MULTI-RISK ANALYSIS AND
INFORMATION SYSTEM COMPONENTS
FOR THE ANDES REGION

Simulating extreme multi-hazard events with decentralized Web-processing services: Towards a better understanding of cascading impact

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Objectives

- Multi-hazard and risk analysis in particular by simulating hypothetical future high-impact events (e.g. earthquakes, tsunamis, etc.) and their consequences
- Design and development of an interoperable distributed software architecture → based on the OGC Web Processing Service (WPS)
- Cover the full range of multi-hazard and risk related data acquisition and simulation services
- Assist local authorities and decision makers to explore factors influencing the risk in their specific multi-hazard environments



Objectives

- Event stories
 - Chile and Peru: Earthquake and tsunami
 - Peru: Heavy rain and river flooding
 - Ecuador: Volcano instability, lahar event and subsequent flooding via temporary river blockage
- Web-based demonstrator platform integrating decentralized OGC Web Processing Service instances into multi-hazard and risk scenarios is being developed



Approach

HAZARD SCENARIOS

- Earthquakes
- Landslides
- Volcanoes
- Floods
- Tsunamis



MULTI-RISK ASSESSMENT

Research

- Exposure models
- Vulnerability assessment
- Cascading effects
- Multi-risk analysis



INFORMATION SYSTEM COMPONENTS

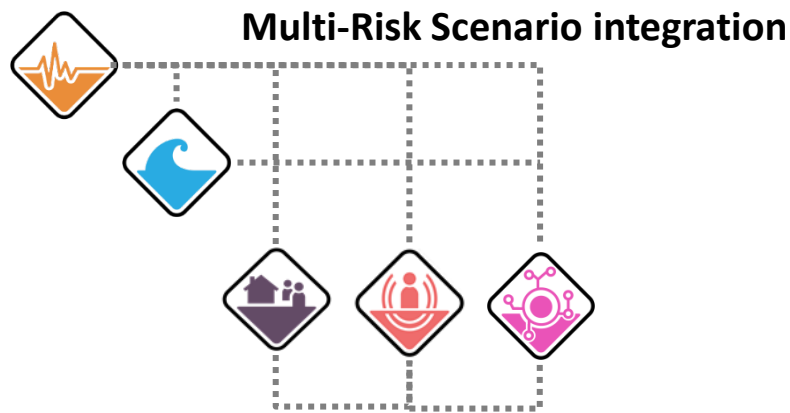
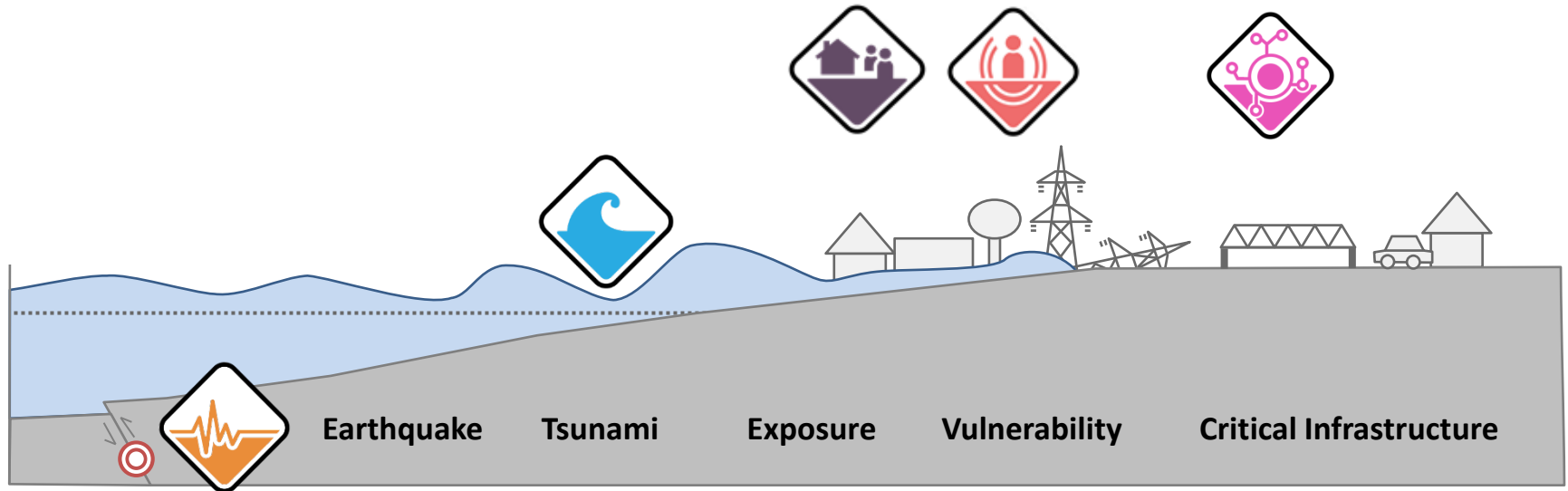
Development

- System architecture
- Web services
- Scenario-based demonstrator



Application

Showcase: Chile



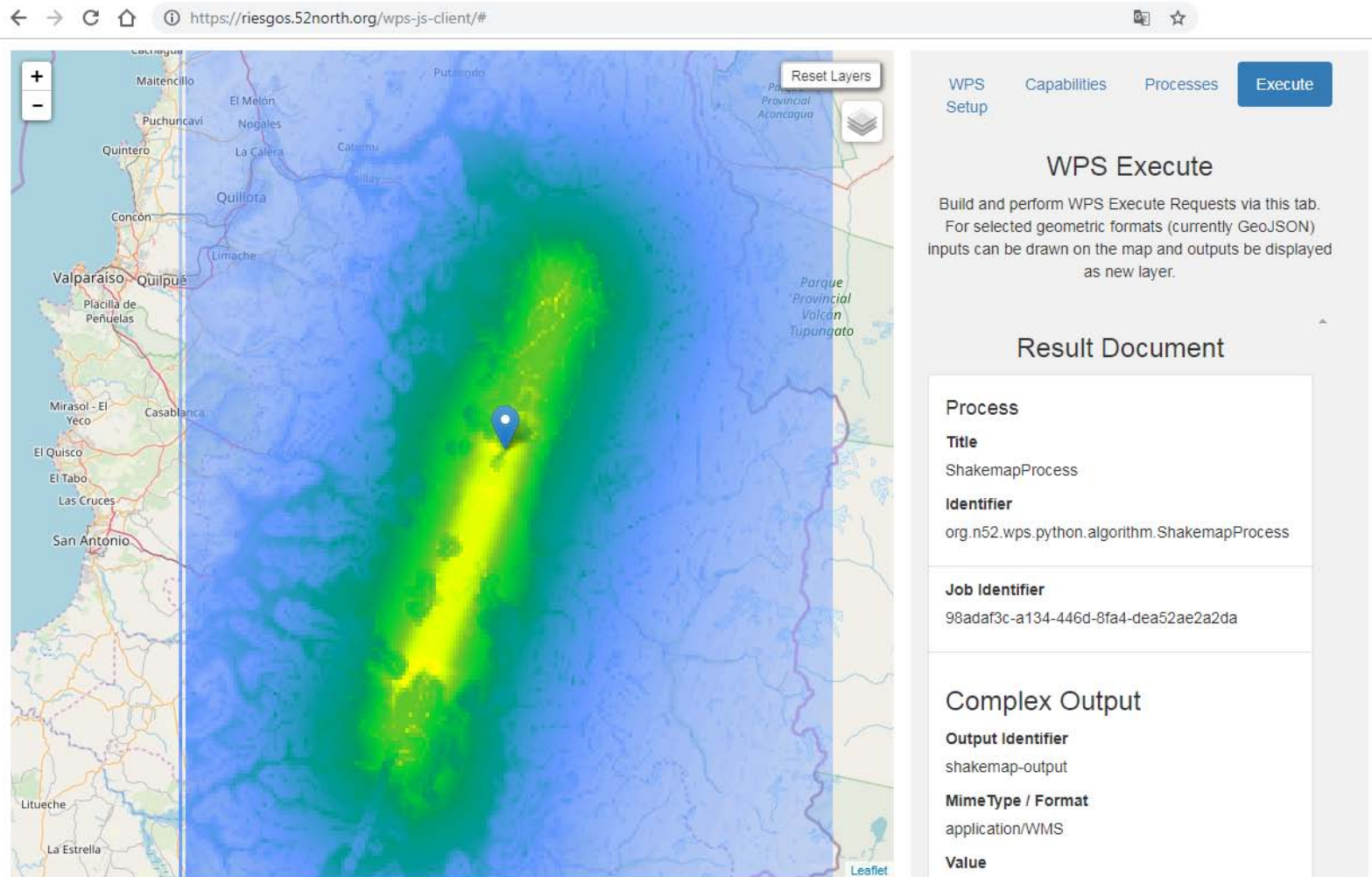
Showcase: Chile – Web services

- OGC Web Processing Services
 - EQ Event Simulation (GFZ)
 - Query of simulated earthquake events based on input parameters, e.g. bounding box
 - EQ ground motion forecasting (GFZ)
 - Creation of shakemaps for given earthquake event
 - EQ TS hazard interaction service (AWI)
 - Query of simulated earthquake events based on input parameters, e.g. bounding box
 - TS physical simulation service (AWI)
 - Creation of isochrones and inundation files (rasters) for given earthquake event

Showcase: Chile – Web clients

- EQ ground motion forecasting

← → ↻ 🏠 ⓘ <https://riesgos.52north.org/wps-js-client/#> 🖨️ ☆



Reset Layers

WPS Setup Capabilities Processes **Execute**

WPS Execute

Build and perform WPS Execute Requests via this tab. For selected geometric formats (currently GeoJSON) inputs can be drawn on the map and outputs be displayed as new layer.

Result Document

Process

Title
ShakemapProcess

Identifier
org.n52.wps.python.algorithm.ShakemapProcess

Job Identifier
98adaf3c-a134-446d-8fa4-dea52ae2a2da

Complex Output

Output Identifier
shakemap-output

Mime Type / Format
application/WMS

Value

Showcase: Chile – Web clients

- TS physical simulation service

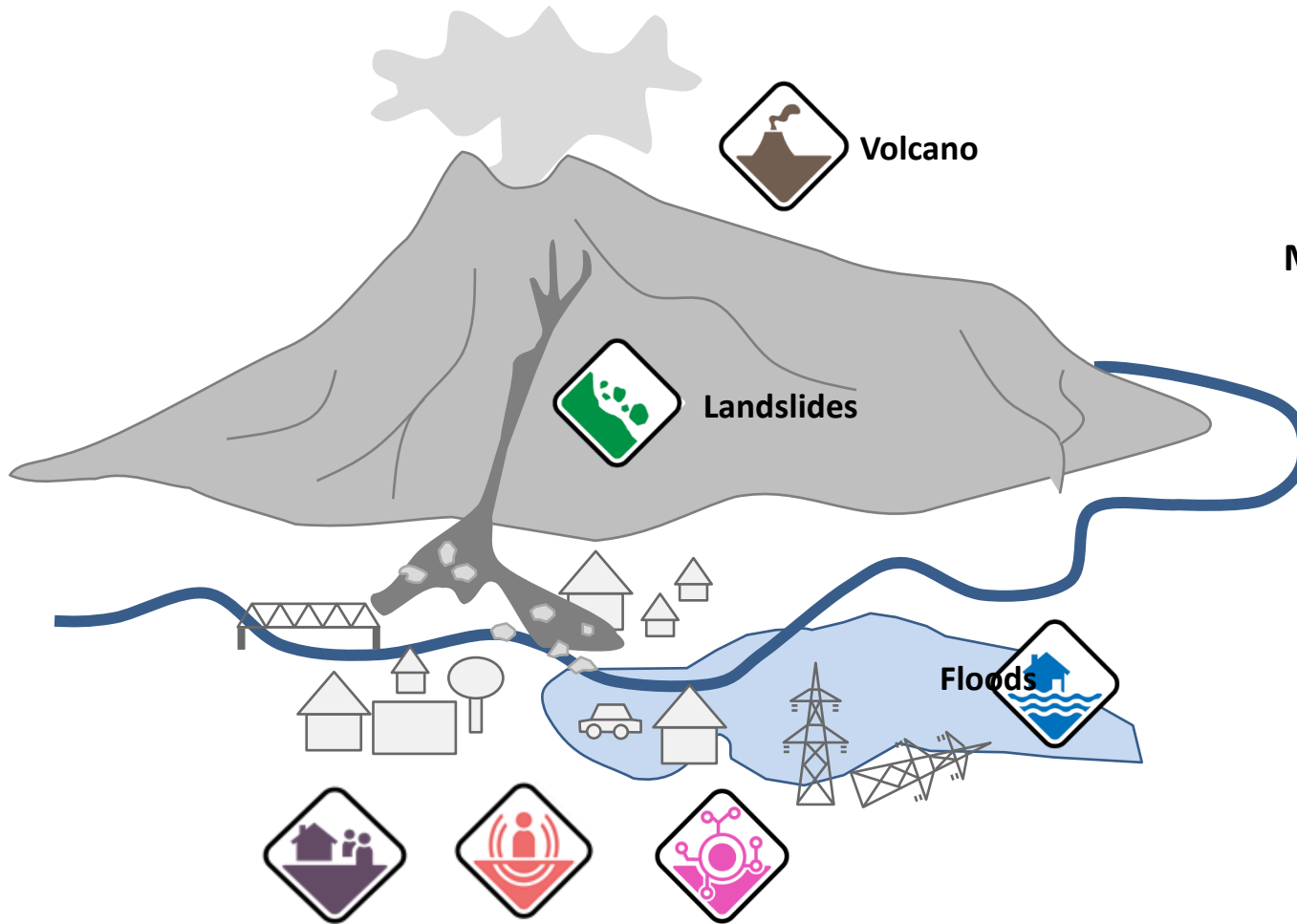
The screenshot displays the WPS-Angular-Client web interface. The browser address bar shows the URL `tsunami-riesgos.awi.de:8080/wps-ng-client/`. The interface features a map of Chile with pink isochrone lines representing tsunami wave propagation. A GeoJSON information panel is overlaid on the map, displaying `timestep: 1800` and `output: isochrones`. A blue location pin is placed near Valparaíso, with a tooltip showing `output: epicenters` and `scenario_id: 10`. On the right side, a configuration panel is visible, showing the following settings:

- WPS Configuration: URL & Version (checked)
- WPS Process: Select a process (checked)
- WPS Execute: Execution mode & Response format (checked)
- WPS Response: ResponseDocument & Outputs (expanded)

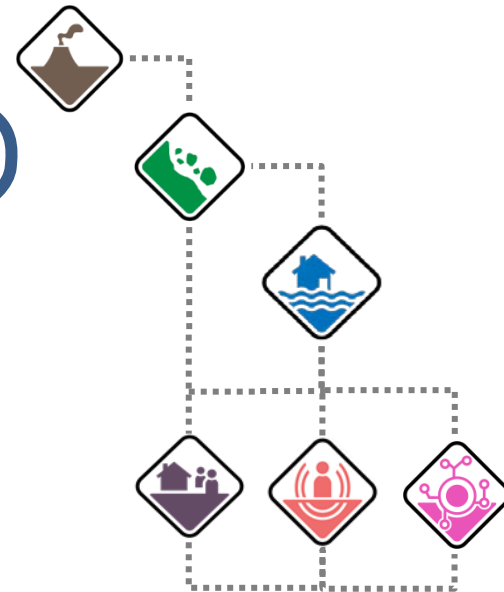
The expanded WPS Response section shows the following details:

- ResponseDocument**
- Process jobid:** 2842d0b8-dc74-4f15-8a74-fa4c5a3211b4
- Expiration date:** 2019-04-10T09:37:09.61016Z
- Outputs**
- Identifier:** isochrones
- MimeType:** application/vnd.geo+json
- Encoding:** UTF-8
- Value:**

Showcase: Ecuador



Multi-Risk Scenario Integration



Exposure Vulnerability Critical Infrastructure

Further Information

<http://www.riesgos.de>

