

An open service-oriented architecture (SOA) for risk management (Orchestra project, FP6 IST)

<http://www.eu-orchestra.org/>

> Identify use cases:

- Find routes cut by a possible event (EQ, flood, forest fires, industrial event, coastal event (oil spills), etc.)
- Find the roads exposed to hazard
- Find alternative routes after a route is cut



Site location for vulnerability analysis of road networks



An open service-oriented architecture (SOA) for risk management

- > Identification of relationships between the different use cases
- > Identification of specific services:
 - Hazard Data Access Service
 - Road Acceptability Criteria Access Service
 - Road Network Access Service
 - Supplementary Time and Distance Calculation Service
 - Traffic Information Access Service
 - Historical Event Access Service

**Data
needed
for Use
Cases
and
related
services**

UC	Road Network	Traffic Information	Historical Events	Hazard Data	Road Acceptability Criteria
Calculate cost of route unavailability	X	X			
Calculate estimated time of unavailability					
Calculate losses of revenue		X			
Find alternative routes after a route is cut	X	X			X
Find routes cut by a possible event	X		X	X	
Find the roads exposed to hazard	X			X	



Use case: Find routes cut by a possible event

Step 1 – User selection of road network, hazard data and historical events

Visualization of the hazard data, the historical events and the road networks as maps

Bounding box

OR
Geographic area identifier

<input type="checkbox"/>	PACA
<input checked="" type="checkbox"/>	Alpes Maritimes
<input type="checkbox"/>	Var
<input type="checkbox"/>	Vaucluse
<input type="checkbox"/>	Bouches du Rhône
<input checked="" type="checkbox"/>	Alpes de Haute Provence
<input type="checkbox"/>	Hautes Alpes
<input type="checkbox"/>	Piemonte
<input type="checkbox"/>
<input type="checkbox"/>	Liguria
<input type="checkbox"/>
<input type="checkbox"/>

Road network selection criteria

Road type	
<input checked="" type="checkbox"/>	Autoroute
<input type="checkbox"/>	Route nationale
<input type="checkbox"/>	Route départementale
<input type="checkbox"/>	Autres routes

Hazard type selection

Hazard type	
<input checked="" type="checkbox"/>	Earthquake
<input type="checkbox"/>	Landslide
<input type="checkbox"/>	Flood
<input type="checkbox"/>	Industrial accident
<input type="checkbox"/>	Traffic accident
<input type="checkbox"/>	Fire
<input checked="" type="checkbox"/>	Forest fire
<input type="checkbox"/>

Launch search

1

2

3

Forest fire 2001 July

Earthquake 2003 August

Legend to be used to distinguish between polygons for historical events and polygons for hazards:
- hatchings for hazards
- plain colors for historical events

Historical event polygons are associated with a label that details the type of event and its date.

Map layers are used as background for the selection and creation of polygons

Next step >>



Use case: Find routes cut by a possible event

Step 2 – Creation and selection of polygons for regions affected by an event

The user simulates the triggering of an event and obtains polygons of the regions affected by the event

The screenshot shows a software interface for creating and selecting hazard polygons on a map. It is divided into three main sections:

- Section 5 (Top Left):** A panel titled "Hazard type" with a legend for hazard types for selected polygons (read-only). The legend lists: Earthquake (red bar), Landslide (white bar), Flood (white bar), Industrial accident (white bar), Traffic accident (white bar), Fire (yellow bar), and Forest fire (yellow bar). Below the legend is a button labeled "Create a new hazard polygon".
- Section 6 (Middle Left):** A panel titled "Hazard type of created polygon selected". The legend lists: Earthquake (checked, red bar), Landslide (white bar), Flood (white bar), Industrial accident (white bar), Traffic accident (white bar), Fire (white bar), and Forest fire (yellow bar). Below the legend is a button labeled "Synchronization between hazard type and created polygon that is selected".
- Map (Right):** A map showing hazard polygons for two events: "Earthquake 2003 August" and "Forest fire 2001 July". The map includes several callout boxes with actions: "Select this polygon", "Unselect this polygon", and "Delete this polygon". A legend on the map explains: bold frames for selected polygons, dashed frames for polygons drawn by the user, plain colors for historical events and use-drawn polygons, and hatching for hazard polygons. It also notes that only historical event polygons can be selected, and hazard polygons are used as guides to draw custom event polygons.

At the bottom of the interface are navigation buttons: "<< Previous step" and "Next step >>".

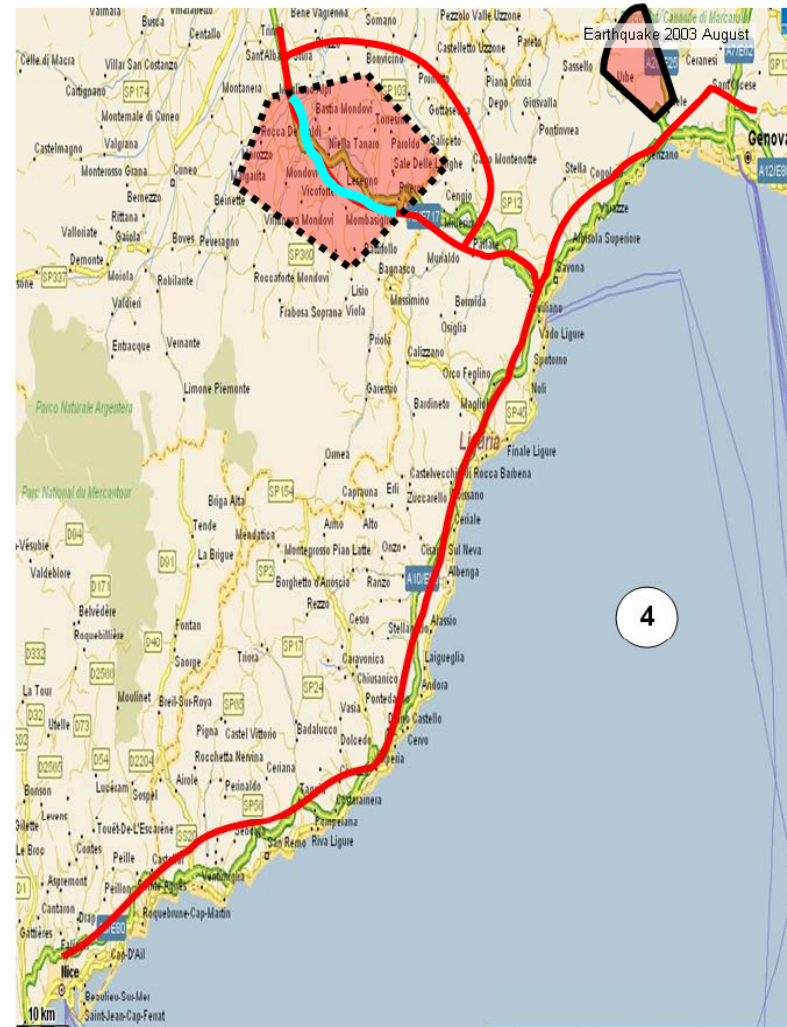
Use case: Find routes cut by a possible event

Step 3 – Identification of cut road sections

The user uses the system to identify roads crossed by the polygons and to calculate the sections affected by the event

This component displays as a new layer the road sections affected by the events

Note : it could be useful to have an export option that allows the user to save the cut road sections (maybe using different kinds of formats : line, end points, ...) However, this option could be needed during development phase for tracking purposes.



<< Previous step Find alternative routes after a route is cut Calculate losses of revenues



Use case: Find alternative routes after a route is cut

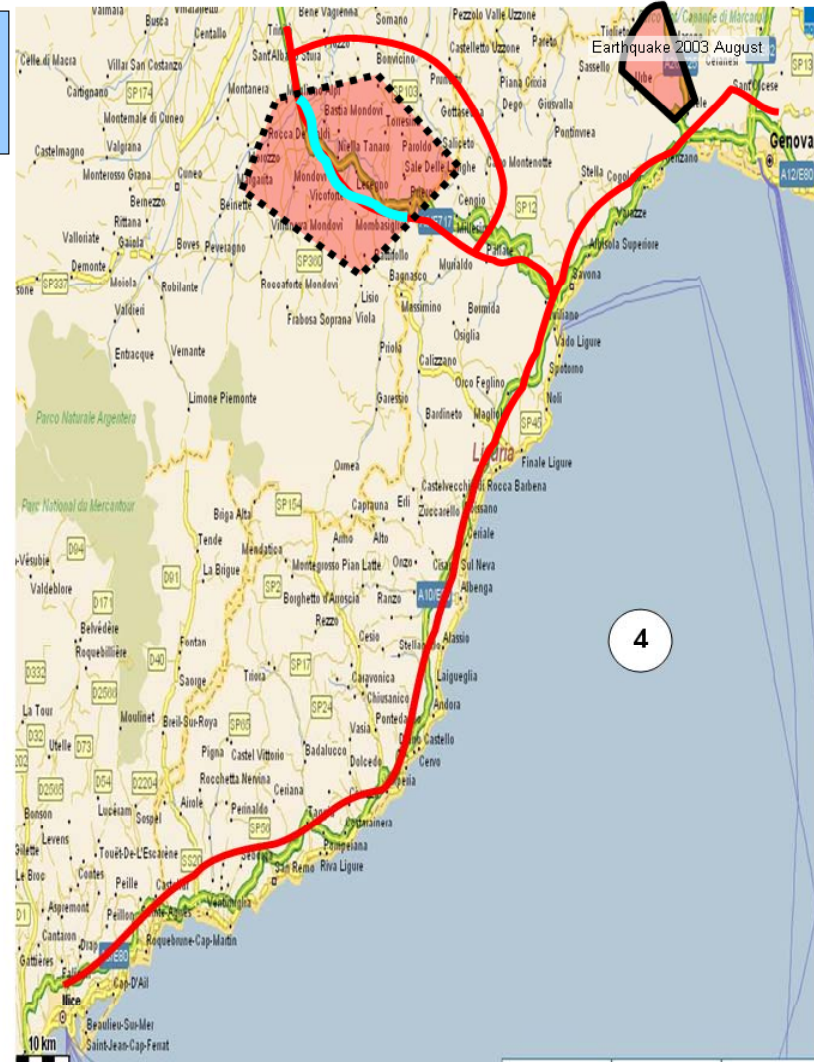
Step 1 – Retrieving traffic information

Traffic information for cut road sections	
Type	Traffic (vehicles / day)
Trucks	150
Buses	2
Cars	500

8

Displayed data depends on the model which will be created for dealing with traffic information. This could include some information about the period of the year or the time of the day.

The user retrieves road networks and traffic information for considered roads



Next step >>



Use case: Find alternative routes after a route is cut

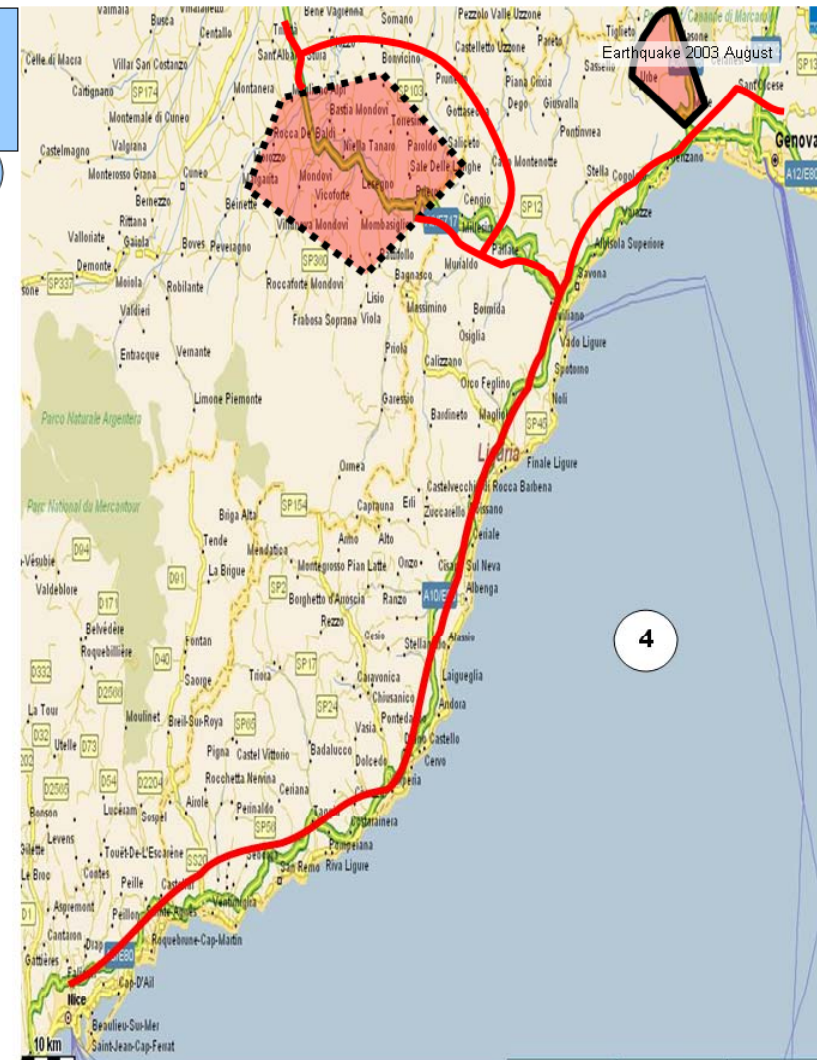
Step 2 – Retrieving road sections that are no longer useable

The user indicates in the road network the location of the sections no longer useable

Traffic information for cut road sections	
Type	Traffic (vehicles / day)
Trucks	150
Buses	2
Cars	500

8

Step 3 – Updating the road network in order to keep only useable roads for each traffic type



Use case: Find alternative routes after a route is cut

Step 4 – Searching for alternative routes

Select traffic type

Type	Traffic (vehicules / day)
• Trucks	150
Buses	2
Cars	500

Select start point and end point of journey

Find alternative route for the journey

This button is enabled only if a journey has been specified

The alternative routes are highlighted on the right components

Note : it could be useful to have an export option that allows the user to save the alternative routes. However, this option could be needed during development phase for tracking purposes.

