

PACES: Preparedness for Appropriate Accommodation in Emergency Shelters



April 19th 2016

Scenario Workshop

Seismic Risk Assessment in Italy and Relevant Scenarios

Agostino Goretti (presented by Danilo Bilotta)

Civil Protection Department, Italy



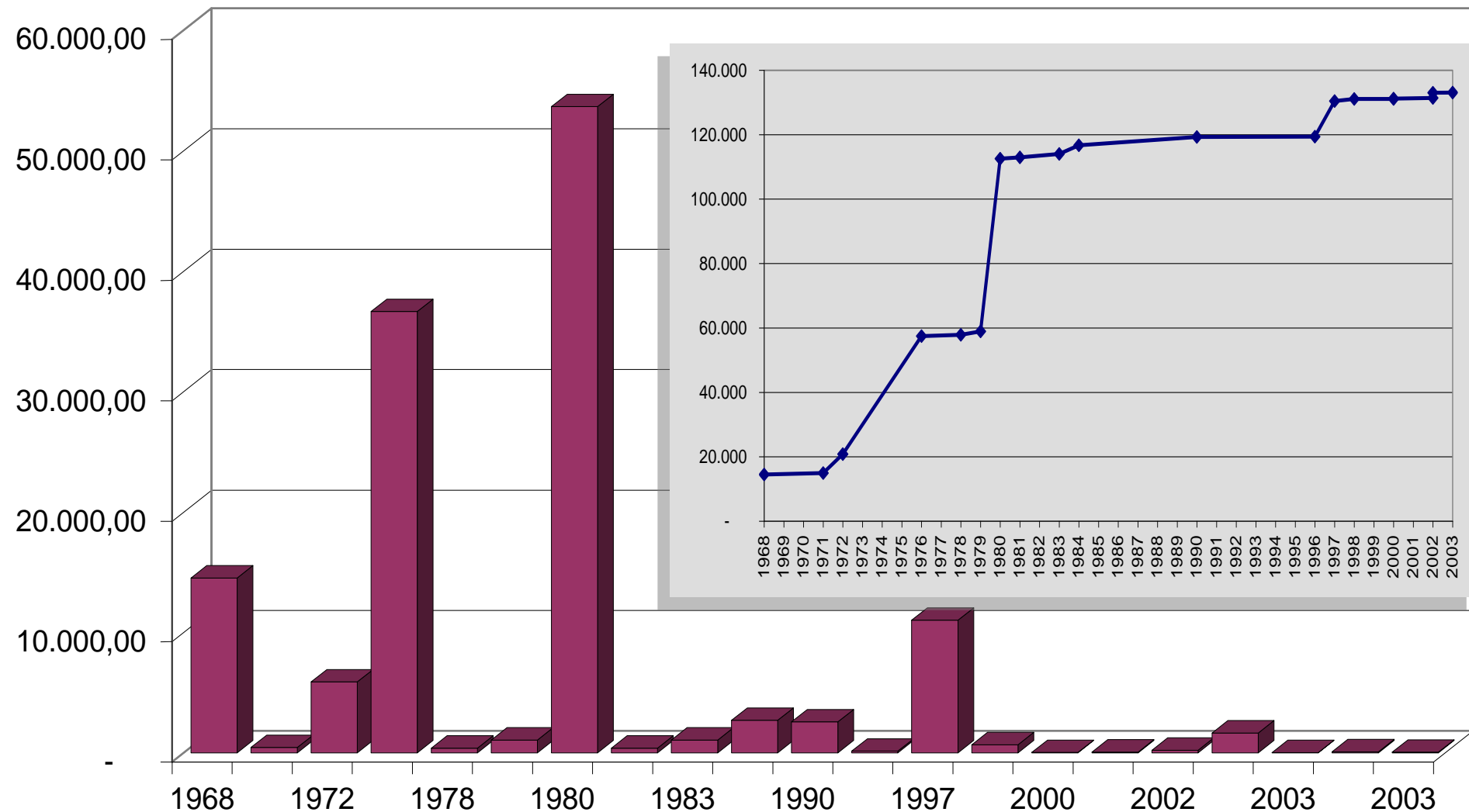
Project co-funded by the EU Humanitarian Aid and Civil Protection



SEISMIC RISK IN ITALY

- More than **30.000** seismic events of moderate or strong intensity since 1000 A.C.
- Among them **220** produced disasters
- More than **150.000** victims in the two last centuries
- About **120.000** millions Euro of losses in the last 30 years

LOSSES IN THE LAST 40 YEARS (M€-2005)





PROJECTIONS

Based on events of the last two centuries and the actual exposure and vulnerability, we expect:

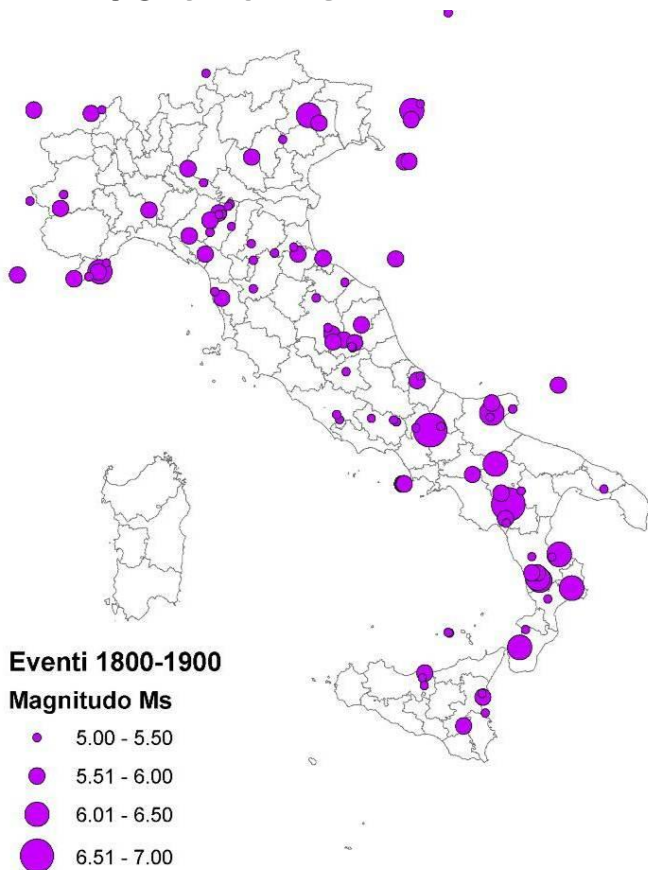
500 – 2,000 victims and injured per year
→ 50,000-200,000 in the XXI century

€ 1 - 2 billion per year
→ € 100-200 billion in the XXI century

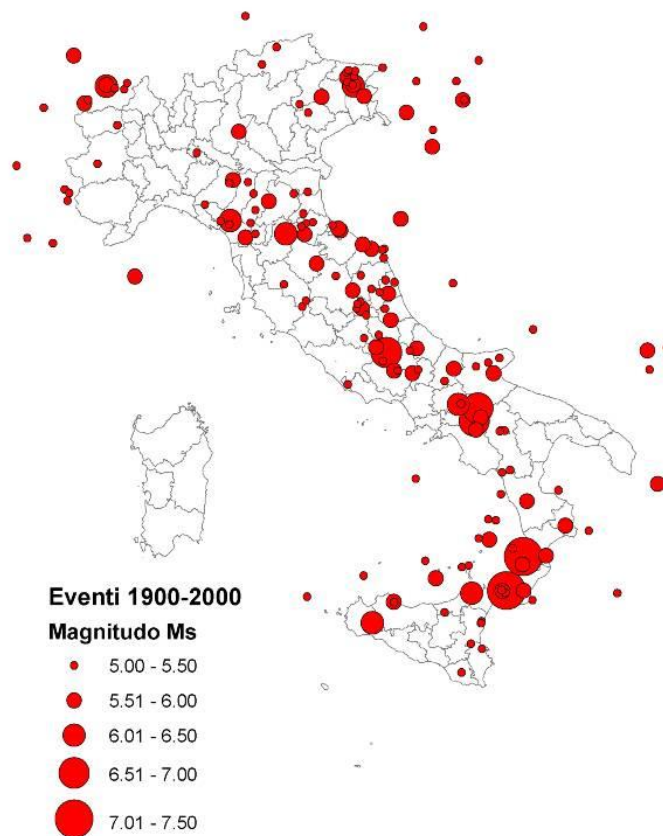
Estimates based on damaged suffered by residential buildings. Considering also public buildings, offices, cultural assets, factories and infrastructures, a 50%-100% increase should be considered

What if we consider a replica of the $M \geq 5$ earthquakes occurred in the last two centuries ?

**From 1801 to 1900:
103 events**



**From 1901 to 2000:
164 events**





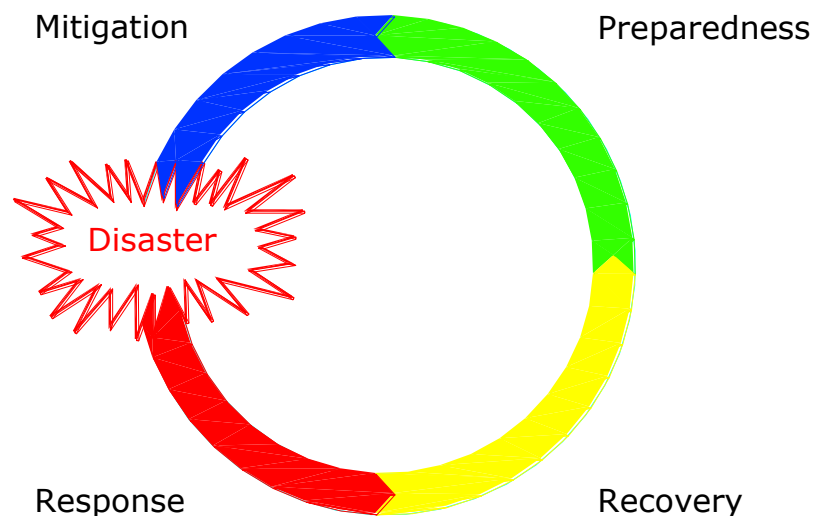
REASONS

High vulnerability of the building stock

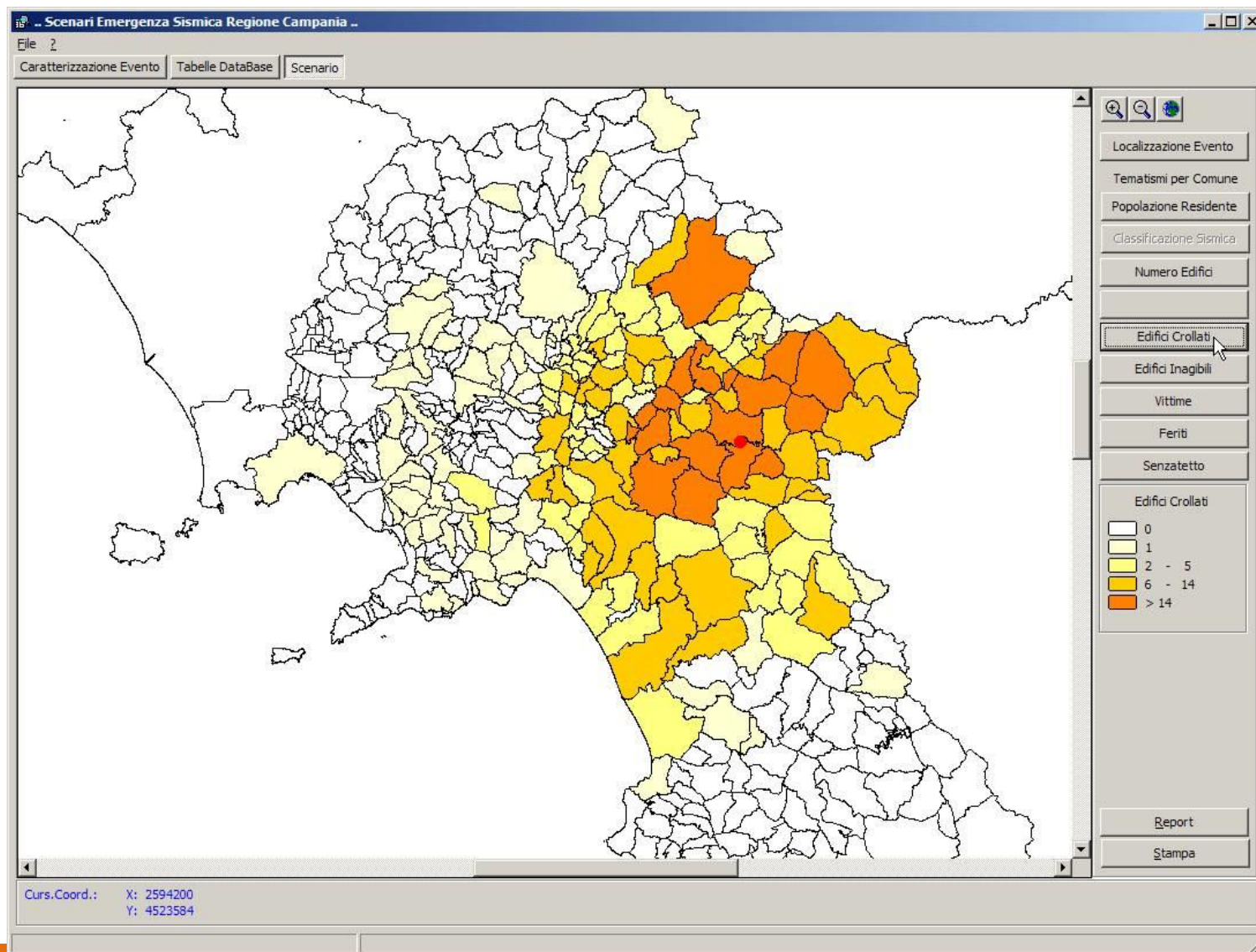
- Old buildings
- Inadequacy of past building codes
- Inadequacy of past seismic classification
- Poor maintenance
- Historical buildings
- Illegal buildings
- Limited awareness of seismic risk

Simulator for real time scenario at national level

- Preliminary information in case of eqk
- Planning
- Exercising
- Raise awareness



Damage Scenario: Collapsed buildings

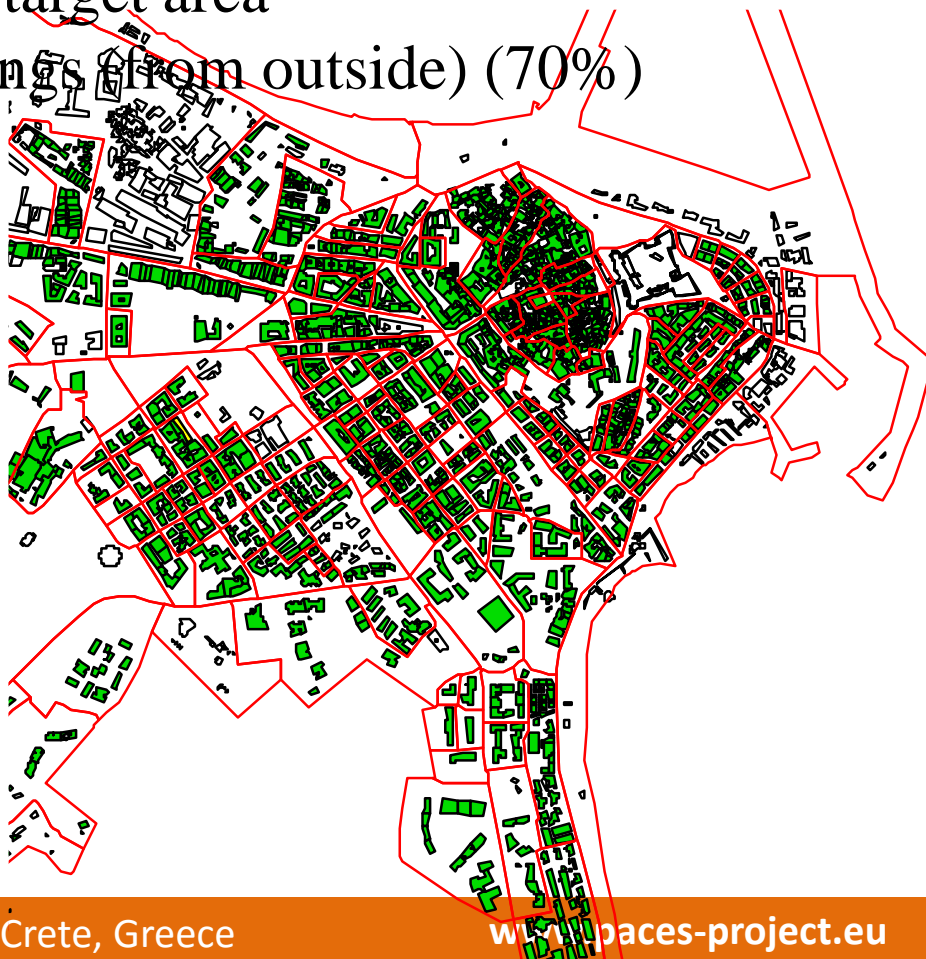
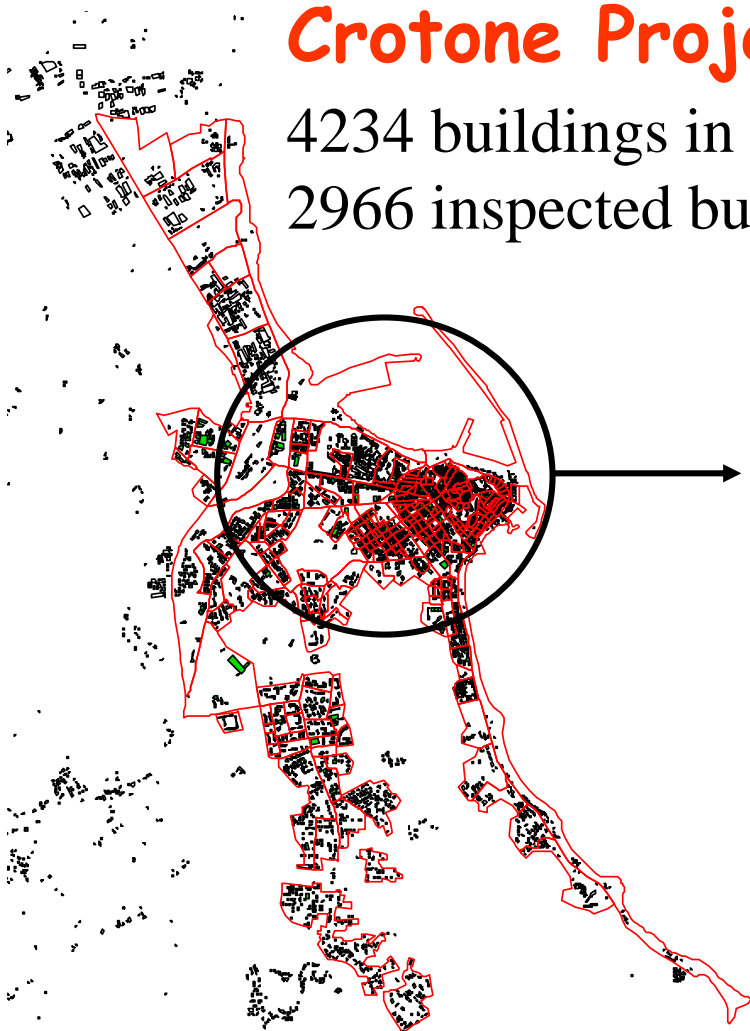


Risk Analysis and seismic scenarios at municipal level

Crotone Project

4234 buildings in the target area

2966 inspected buildings (from outside) (70%)





Seismic scenario for the PACES TT exercise



1. Integration method

- Select the affected area*
- Select a reference earthquake*
- Run the simulator*
- Integrate the results (damage to residential buildings and casualties) with additional information on other components*



M5.5 Eastern Sicily

DPC-SIV Programma ScEMCS (Vers. 1.0)

- conversione $M_l \rightarrow M_w$: $M_w = 1.0$
- conversione $M_w \rightarrow I_0$: $I_0 = 2$
- correzione con la profondità
- Attenuazione I_{jms} : per $M_l \leq 5.5$ Gomez Capera 2008; per $M_l > 5.5$ Pasolini 2008;

DPF versione 1.00
Soglia di attivazione: 1.00
Gestione inerte: 1.00
Gestione inerte: 1.00

Data evento = 17/04/2014
Ora evento = 16.30

Magnitudo evento: $M_w = 5.70$; $M_l = 5.50$
Intensità epicentrale = 8.0

Posizione epicentro

Definizioni della scala di emergenza sismica		
Effetti	Azioni	Soggetti
0	Non rilevanti	Contatti telematici
1	Probabili danni ai manufatti	Superalloggi
2	Danni ai manufatti. Limitato numero senza tetto.	Superalloggi. Verifica condizioni organizzative. Eventuali alloggi alternativi.
3	Danni estesi. Probabili crolli in crolli (pochi). Elevato numero senza tetto.	Coordinamento generale. CCM. Rilevamento danni. Alloggi provvisori.
4	Danni gravi e crolli. Crolli in crolli (molti).	Squadre SAE. Ospedali. Rilevamento danni. Alloggi provvisori.
5	Devastazione su grande scala.	SAE. Ospedali. Rilevamenti. Alloggi provvisori. Aiuti internazionali.

Istat	Municipality	Intensity	Dwellings	Collapsed	Unusable	% Collapsed	% Unusable
19087001	Acì Bonaccorsi	7.5	1115	2	103	0.18	9.24
19087002	Acì Castello	7.5	9852	9	344	0.09	3.49
19087003	Acì Catena	7.0	10314	2	147	0.02	1.43
19087004	Acireale	7.0	23364	13	844	0.06	3.61
19087005	Acì Sant'Antonio	7.0	6944	4	210	0.06	3.02
19087007	Belpasso	6.5	8729	2	184	0.02	2.11
19087015	Catania	7.0	138871	122	6805	0.09	4.90

19087053	Viagrande	7.1	3	165	4	244
19087055	Zafferana Etnea	6.4	1	129	1	154

RIEPILOGO DEI RISULTATI PER L'AREA EPICENTRALE (IMCS >= VI)

Totale comuni	31
Totale abitanti comuni	773931
Totale abitazioni comuni	346742

IMPATTO COMPLESSIVO SULLE ABITAZIONI PER LIVELLI DI DANNO			
	Val. 16%	Val. med	Val. 84%
Abitazioni con danno D1	37260	70494	102968
Abitazioni con danno D2	18822	26821	37625
Abitazioni con danno D3	6037	9634	13808
Abitazioni con danno D4	1088	2116	3588
Abitazioni con danno D5	73	191	414

IMPATTO COMPLESSIVO SU ABITAZIONI E POPOLAZIONE

	Val. 16%	Val. med	Val. 84%
Totale abitanti in abitazioni con danno D1	191	414	414
Totale abitanti in abitazioni con danno D2	1941	17810	17810
Totale residenti in abitazioni con danno D3	354	748	748
Totale residenti in abitazioni con danno D4	13081	32165	32165
Totale residenti in abitazioni con danno D5	13081	32165	32165
Somma prodotti superf.x liv. di danno (mq)	1337187.	2275630.	3387608.

Livello di emergenza ES = 3
Danni estesi. Probabili coinvolti in crolli (pochi). Elevato numero di senza tetto

Add

- Effects on Health system
- Effects on Road system
- Effects on Telecommunication system
-



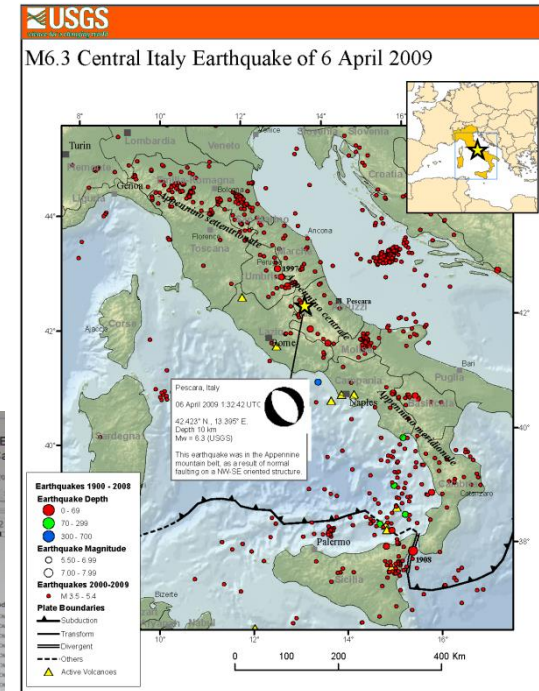
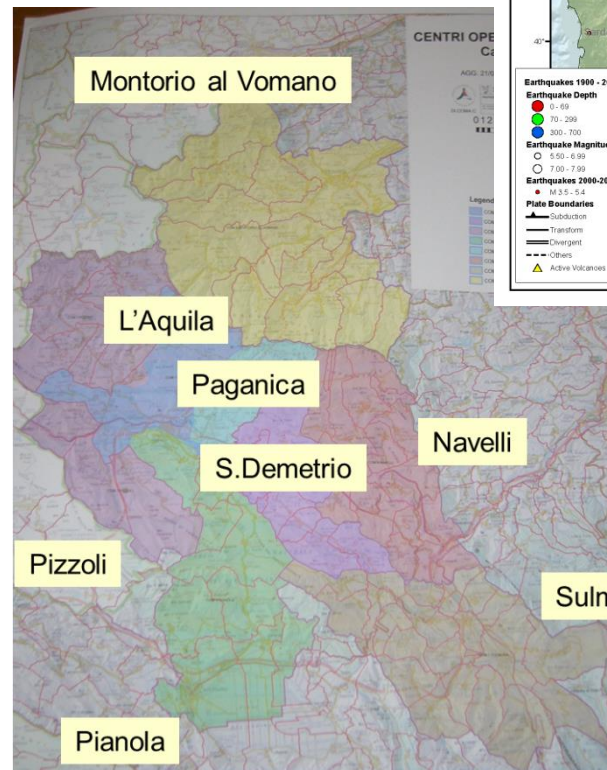
2. Real event method

- Take the consequences of a real event*
- Add additional information*

The real consequences may not be adequate to the PACES exercise objectives

Difficult to add additional elements in a coherent manner

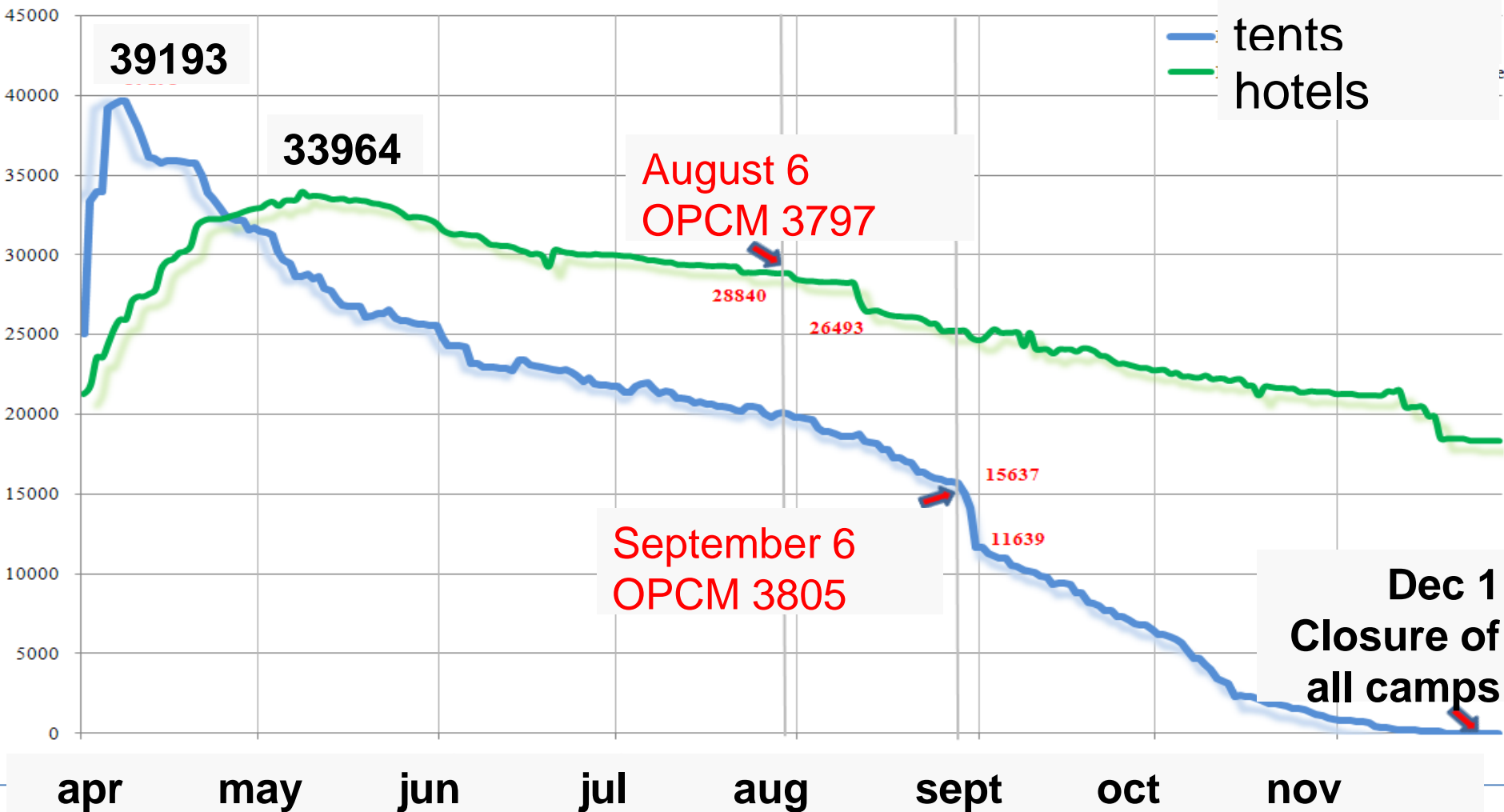
L'Aquila 2009 earthquake



ASSISTED POPULATION



POPOLAZIONE ASSISTITA
Confronto aree di accoglienza e strutture ricettive





3. Take the scenario of a previous exercise

- *Take an existing scenario*

The existing scenario should be adjusted to the objectives of the PACES project

