2009 National Lifelines Forum
7 and 8 October
Christchurch

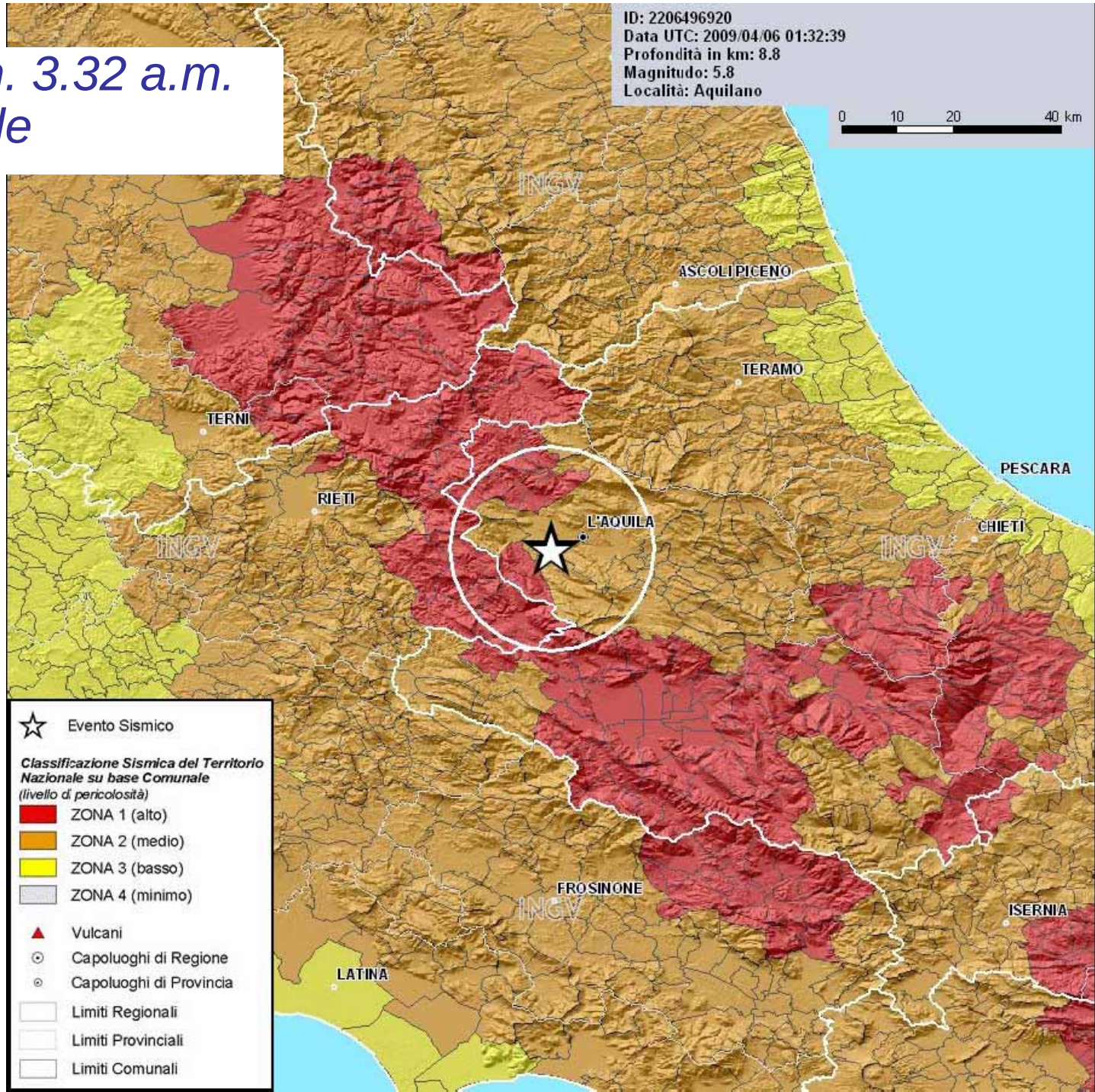
Issues and Lessons for Lifelines from the April 2009 L'Aquila earthquake in Italy

Dr Sonia GIOVINAZZI

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

L'Aquila

6 April 2009 - h. 3.32 a.m.
5.8 Richter Scale



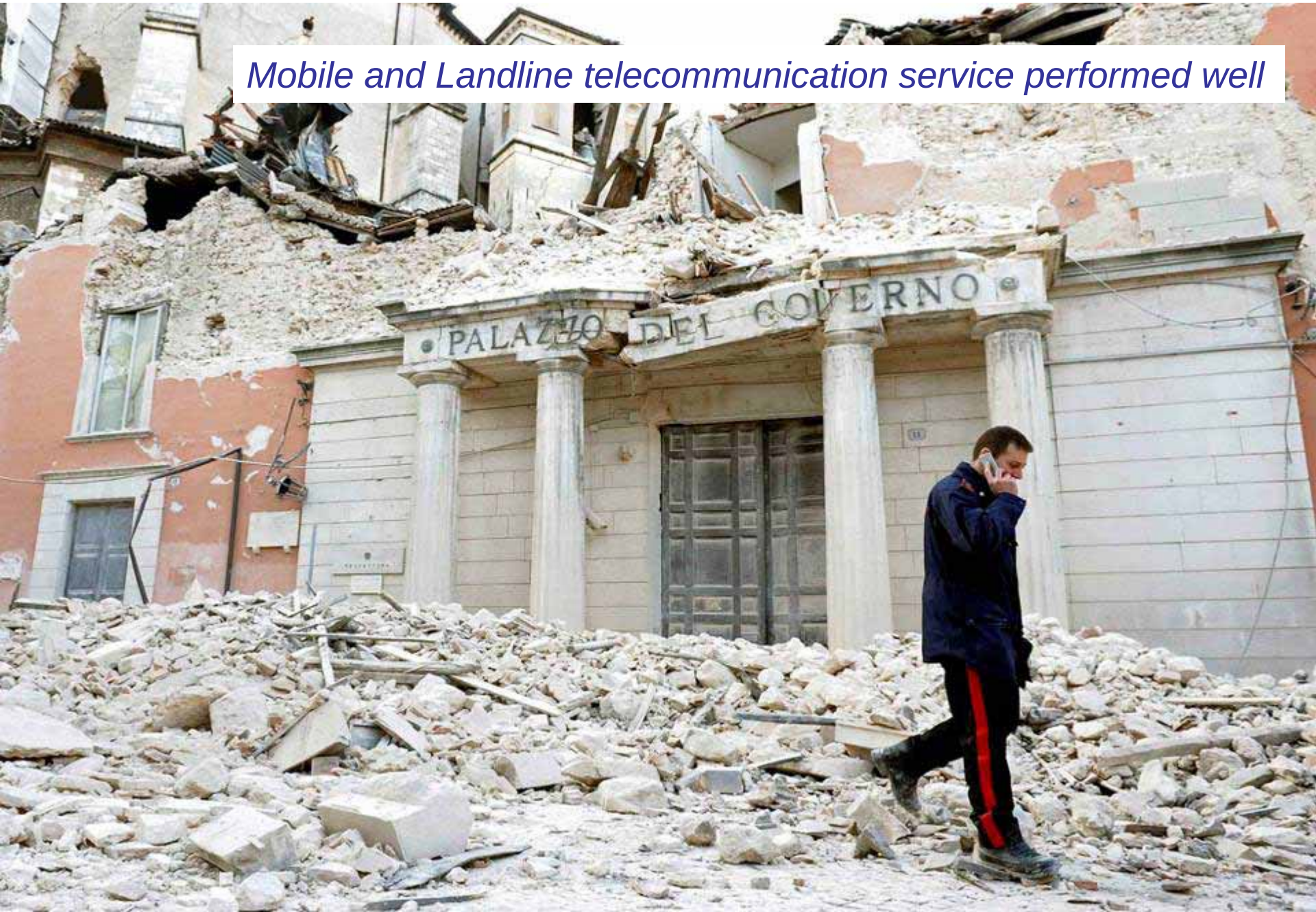
Destroyed houses in the village of Onna are seen in this aerial view near L'Aquila, Italy on April 7, 2009.

An aerial view of Santa Maria Paganica church in L'Aquila, central Italy, on Tuesday, April 7, 2009

FIRST RESPOSE - The first 12 hours

Rescue workers search for survivors under a collapsed house in downtown Aquila April 6, 2009.

Communication



Mobile and Landline telecommunication service performed well

Electric Power

An excavator digs near a collapsed building in Aquila April 6, 2009.

Electric Power

Damage to the rigid connection of a transformer

30 posts damaged
180 pedestal connection boxes dislocated

Damage to pedestal box

6 April 9 a.m. the system **was functional**

Electric Power Headquarters and Equipment severely damaged

GAS Network

PRIORITY - Safety for The Rescuers

621km pipeline network

234 km Medium Pressure (2.5-3 bar)

387 km Low Pressure (0.025 – 0.035 bar)

3 Main Reduction Cabins

300 Reduction Groups

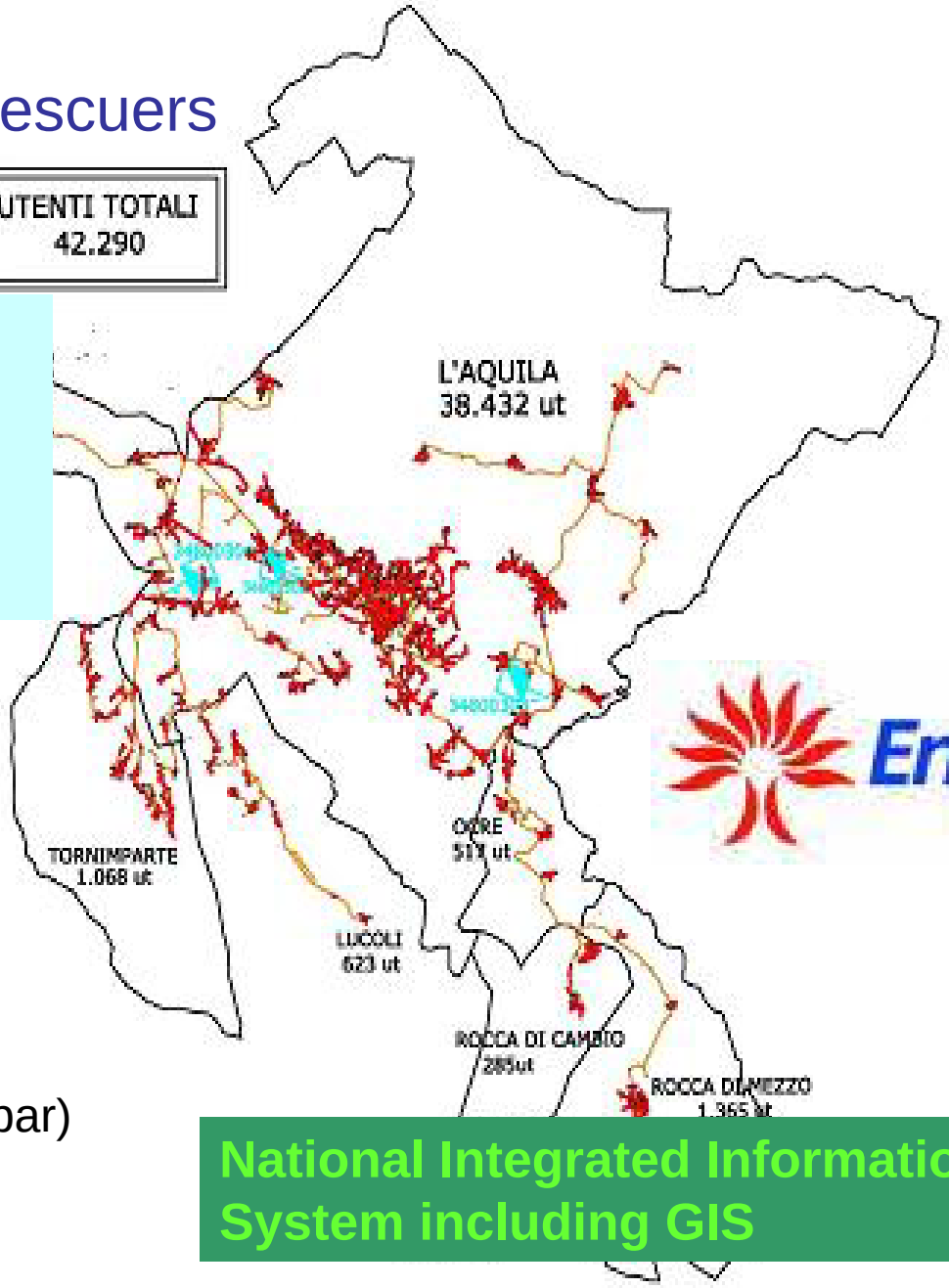
National SNAM GAS Network

GAS Network

PRIORITY - Safety for The Rescuers

6 April 6 a.m. system **shut-off**

Enel Rete GAS Headquarters and Equipment **severely damaged**



621km pipeline network

234 km Medium Pressure (2.5-3 bar)

387 km Low Pressure (0.025 – 0.035 bar)

3 Main Reduction Cabins

300 Reduction Groups

National Integrated Information System including GIS

PRIORITY - Mobility for The Rescuers

6 April 4 a.m. tollbooths closed

A24 Highway “Autostrada Dei Parchi”

FIRST RESPOSE - DAY 1

April 6, 2009

4.15: Crisis Unit of the Department of Civil Protection

4.40: DPC teams departure

4.40: Operational Committee of Civil Protection meeting

7.00: State of Emergency

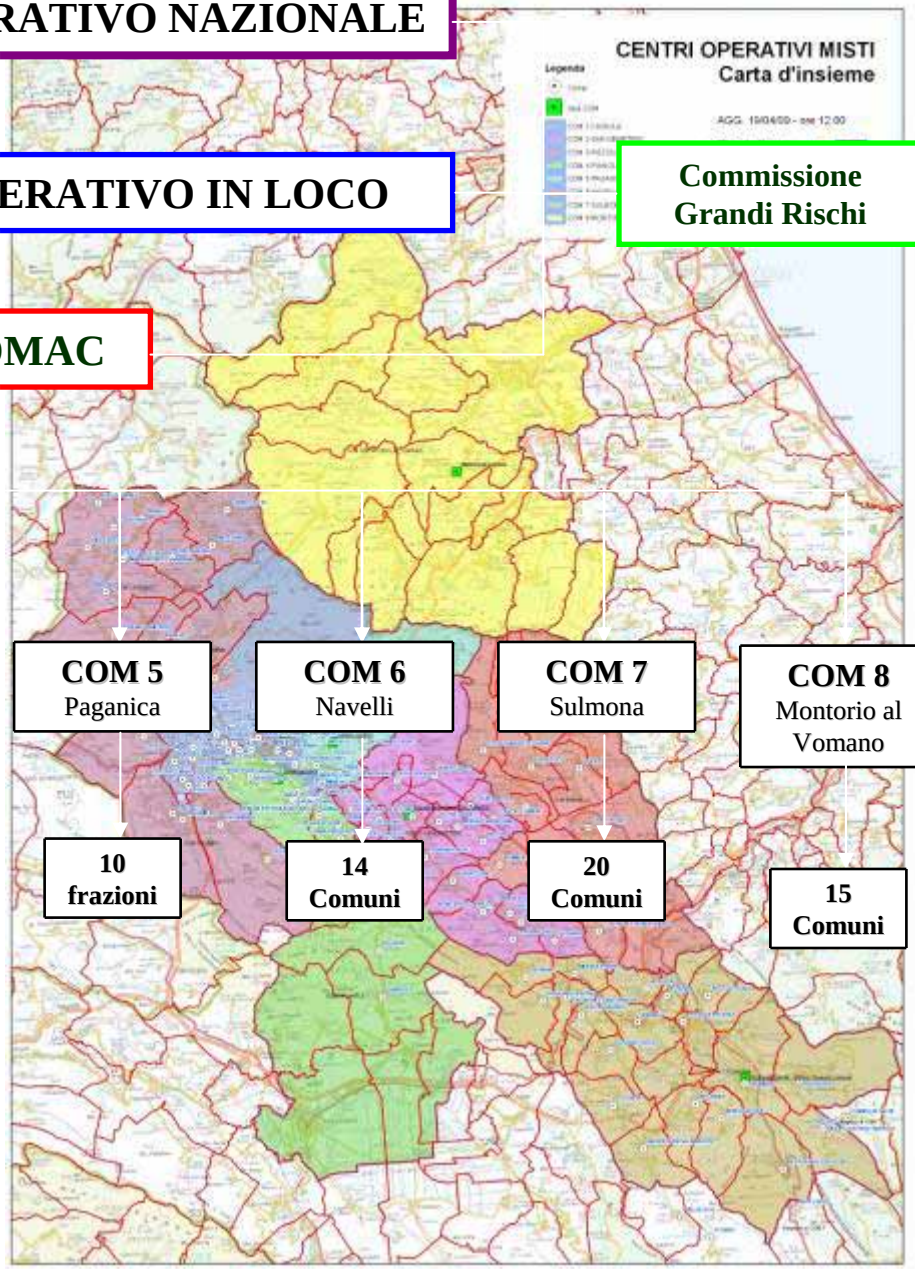
9:00: Organization of the Direction of Command and Control on site

COMITATO OPERATIVO NAZIONALE

COMITATO OPERATIVO IN LOCO

DICOMAC

Commissione Grandi Rischi



COM 1	COM 2	COM 3	COM 4	COM 5	COM 6	COM 7	COM 8
L'Aquila	San Demetrio	Pizzoli	Pianola	Paganica	Navelli	Sulmona	Montorio al Vomano
1 Comune	12 Comuni	9 Comuni	8 Comuni	10 frazioni	14 Comuni	20 Comuni	15 Comuni

A dog searches through rubble in the village of Onna, a day after the earthquake

PRIORITY

Guarantee the Functionality for Strategic Services

PRIORITY

Assist The Population

Local people who were evacuated following the earthquake the day before, wake up after spending the night in a shelter set up in a gymnasium of L'Aquila sport center university early on April 7, 2009.

FIRST RESPOSE - DAY 1
Regional Road Network

1) rapid survey of the road network to ensure, at the largest possible extent, the regional mobility
2) activation of emergency contracting procedures ("*somma urgenza*" agreements) to immediately begin, activities for the restoration of normal mobility conditions

S.S. 5 “Tiburtina Valeria” rockfalls

S.S. 80 “del Gran Sasso d’Italia” rockfalls on rock-proof tunnel

S.S. 80 “del Gran Sasso d’Italia” landslides triggered by the earthquake

debris from damaged residential and monumental buildings adjacent to the roads

Church in Paganica

unsafe residential and monumental buildings adjacent to the roads

Immediate activities for the restoration of normal mobility conditions included:

1) removal of rocks and soil from the roads
2) rock slope consolidations
3) enhancement of soil slope stability
4) Securing of unsafe buildings adjacent to roads

PR & HR average daily commitment of 80 men and 70 vehicles

Temporary Traffic Management Solutions

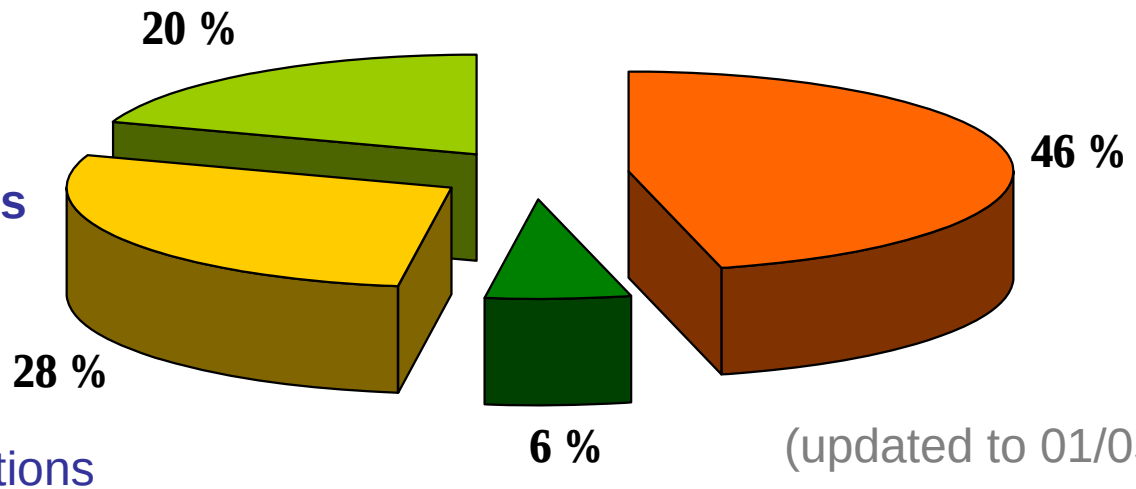
61 road tracts affected

red = road closed;

dark green = weight limitations

yellow = alternating one way

light green = lane and velocity restrictions

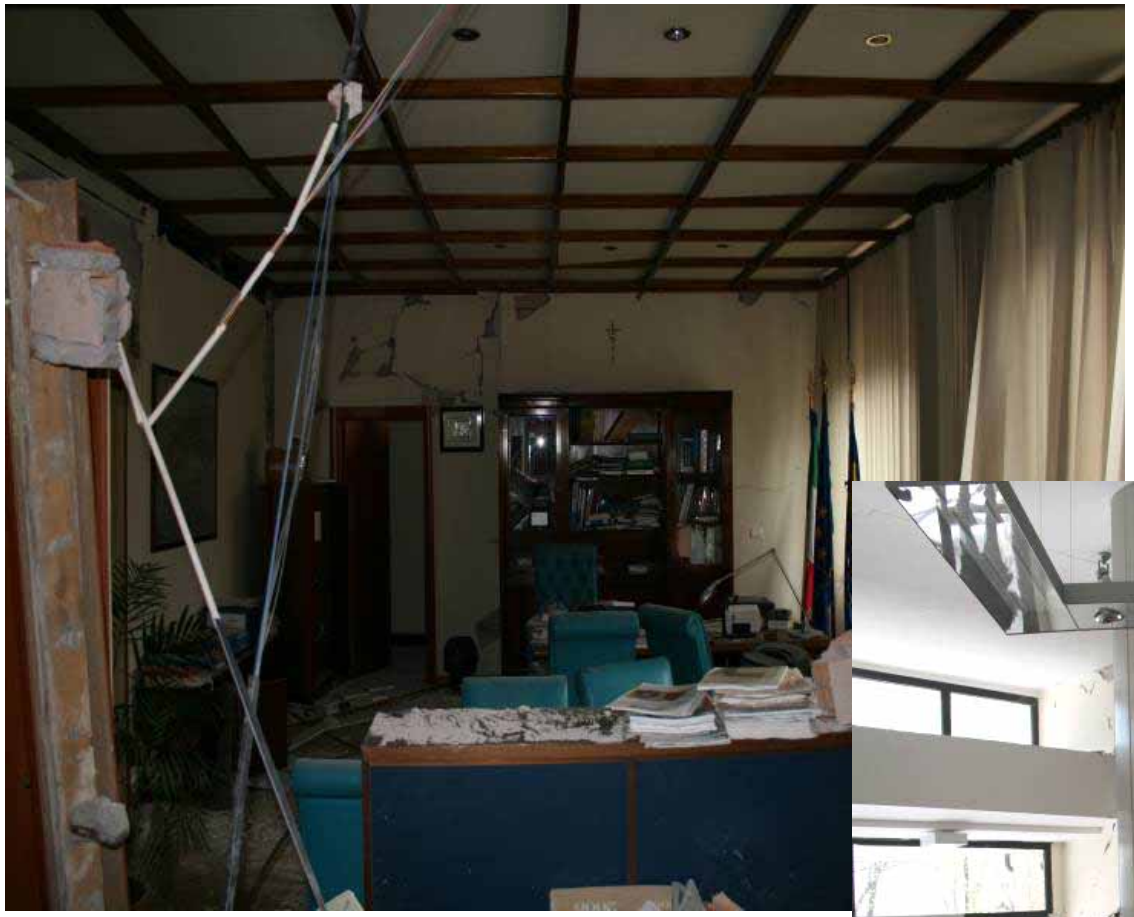


(updated to 01/05/09)

ANAS Headquarters

ANAS Headquarters

ANAS Headquarters



ANAS Depot and Contractor House

Church in Paganica

Vertical Shoring System

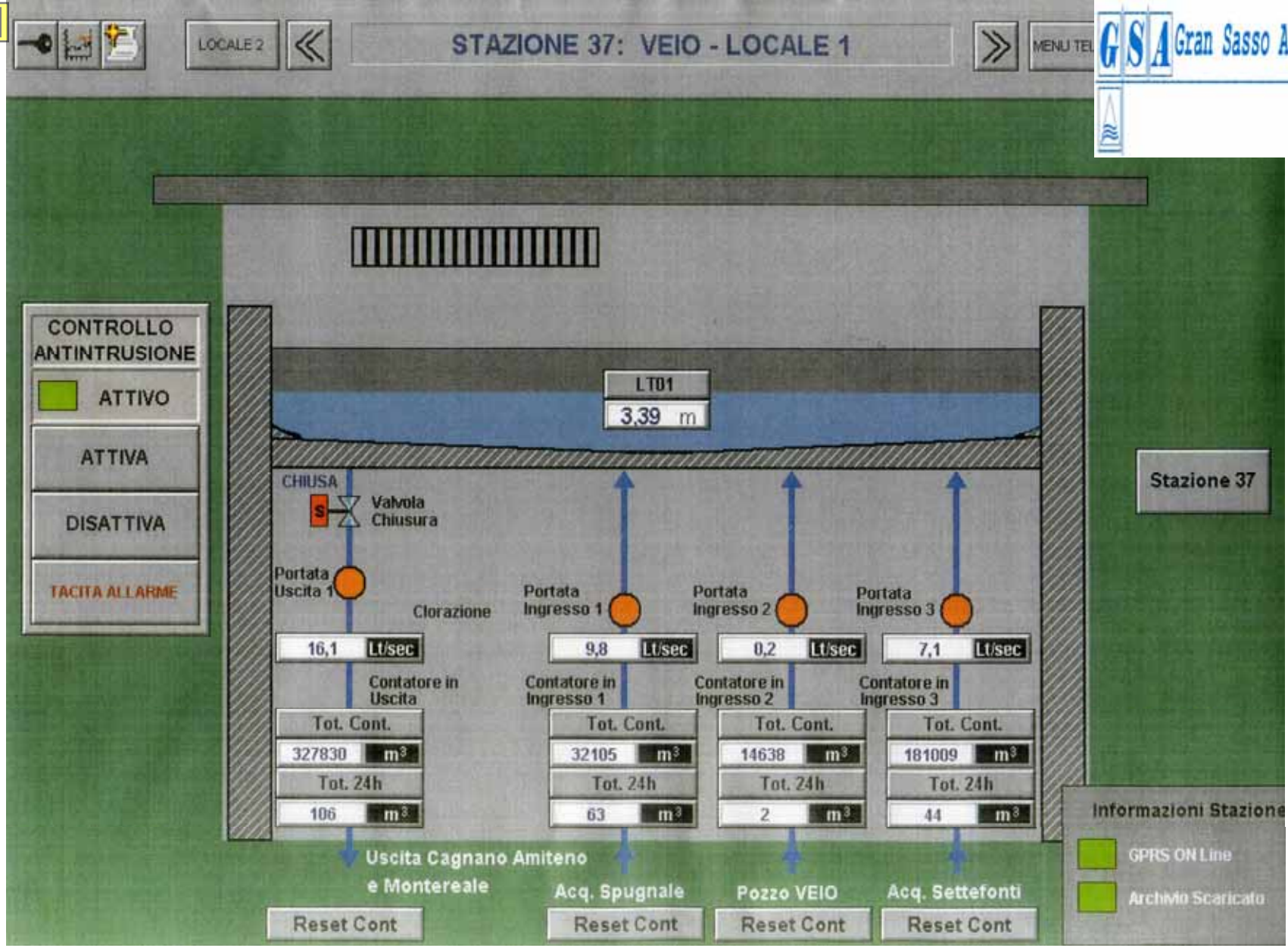
FIRST RESPOSE - DAY 1
Water Network

Gran Sasso Acqua G.S.A. SpA is the water provider for L'Aquila city and for 37 municipalities in the earthquake area.
approximately 100000 customers

integrated water service including potable water supply, sewerage and wastewater treatment.

Potable water network

3 major supply systems
900km large diameter pipes transportation network (30-50 atm)
200 storage tanks
110000 km distribution network - old cast iron and steel pipes (6-8 atm)



remote control service and guided valves connected, through cables or wireless connection, to the main reservoirs and supply systems

Potable Water Network

Joint slip-off in a main water network pipeline in Paganica.

Wastewater treatment plant

(a) partial collapse of a longitudinal wall and of the pipe connected to it

Detail of the detachment of the orthogonal walls at the edges.

(c) Displacement of the pump in the control room.

FIRST RESPOSE - DAY 2

PRIORITY – Support Civil Defence for the installation of Relief Camps

PRIORITY – Support Civil Defence for the installation of Relief Camps


PROTEZIONE CIVILE
NAZIONALE
Presidenza del Consiglio dei Ministri
Dipartimento della Protezione Civile

RECOVERY

Coppito Barack: Headquarters for the Emergency Coordination

Di.Coma. C in Coppito Barack

COMMON PRIORITIES

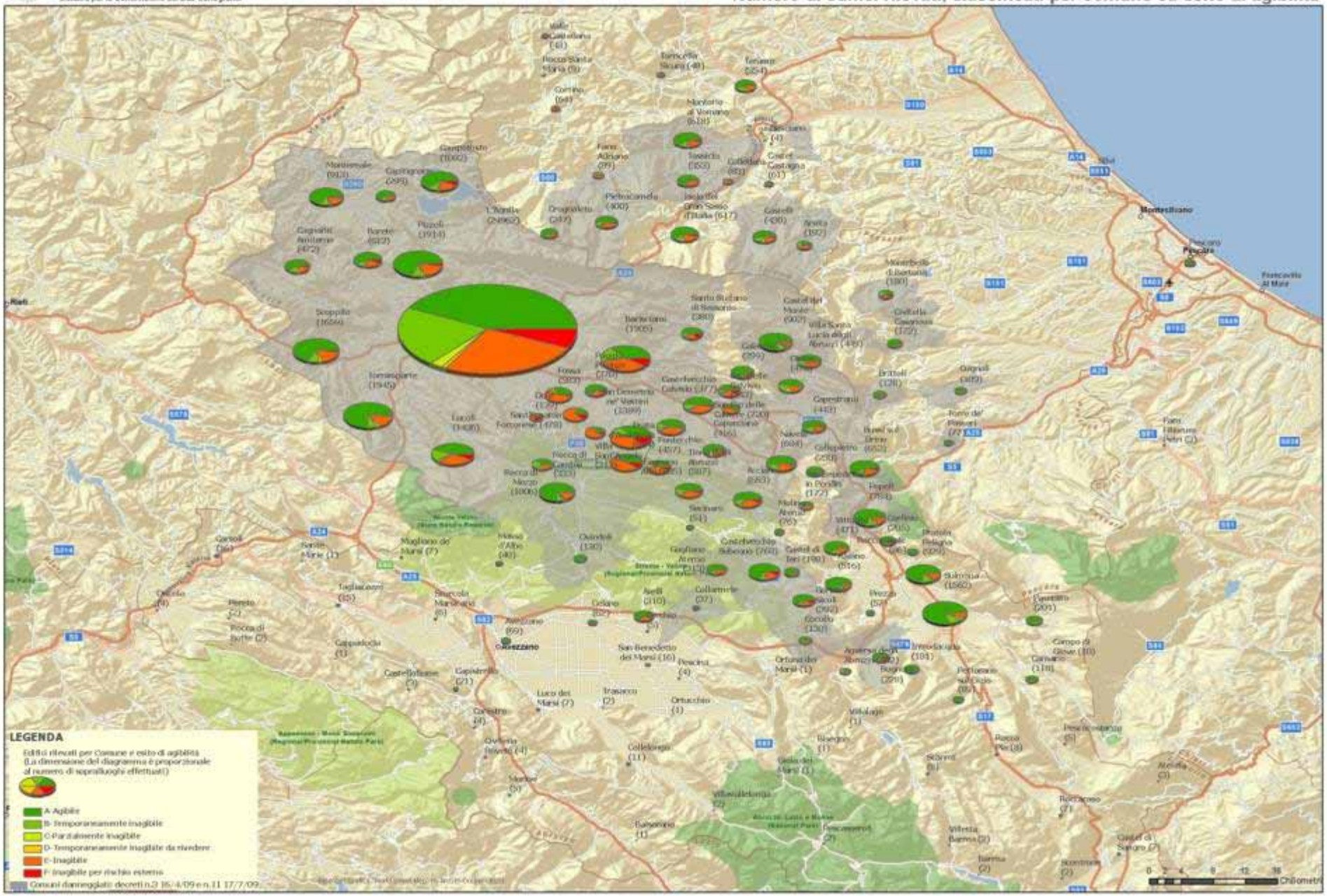
Road Water and Gas Networks

Functionality Restoration and Damage Repair

1. Strategic Services
2. Commercial and industrial activities, including activities (e.g. hotels) to be reopened for the G8 meeting,
3. Residential buildings classified safe, after the specific AeDES survey

Presidenza del Consiglio dei Ministri
Dipartimento della protezione civile
Sistema per la Condivisione dei Dati Cartografici

Rapporto attività di sopralluogo effettuate al 25 luglio 2009 (schede informatizzate 64187).
Numero di edifici rilevati, classificati per comune ed esito di agibilità



Mobility Function – in Di.Coma. (Coppito Barack)

Road Network

Coordination

Road Network

Damage Survey, Temporary Traffic Management,
Communication,

Gas Network

Coordination

Essential Facilities Function in Di.Coma.C

Gas Network

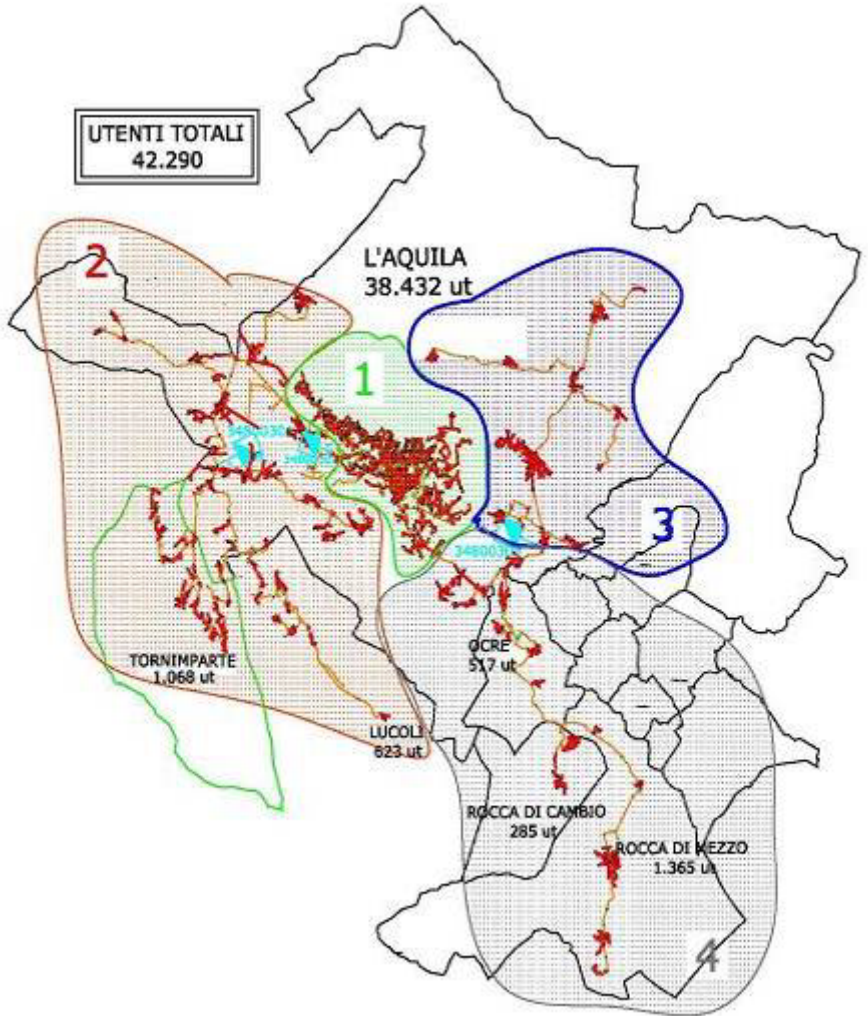
Damage Repair

Pipe in Onna

Gas Network

Step for Reactivation of the shut network

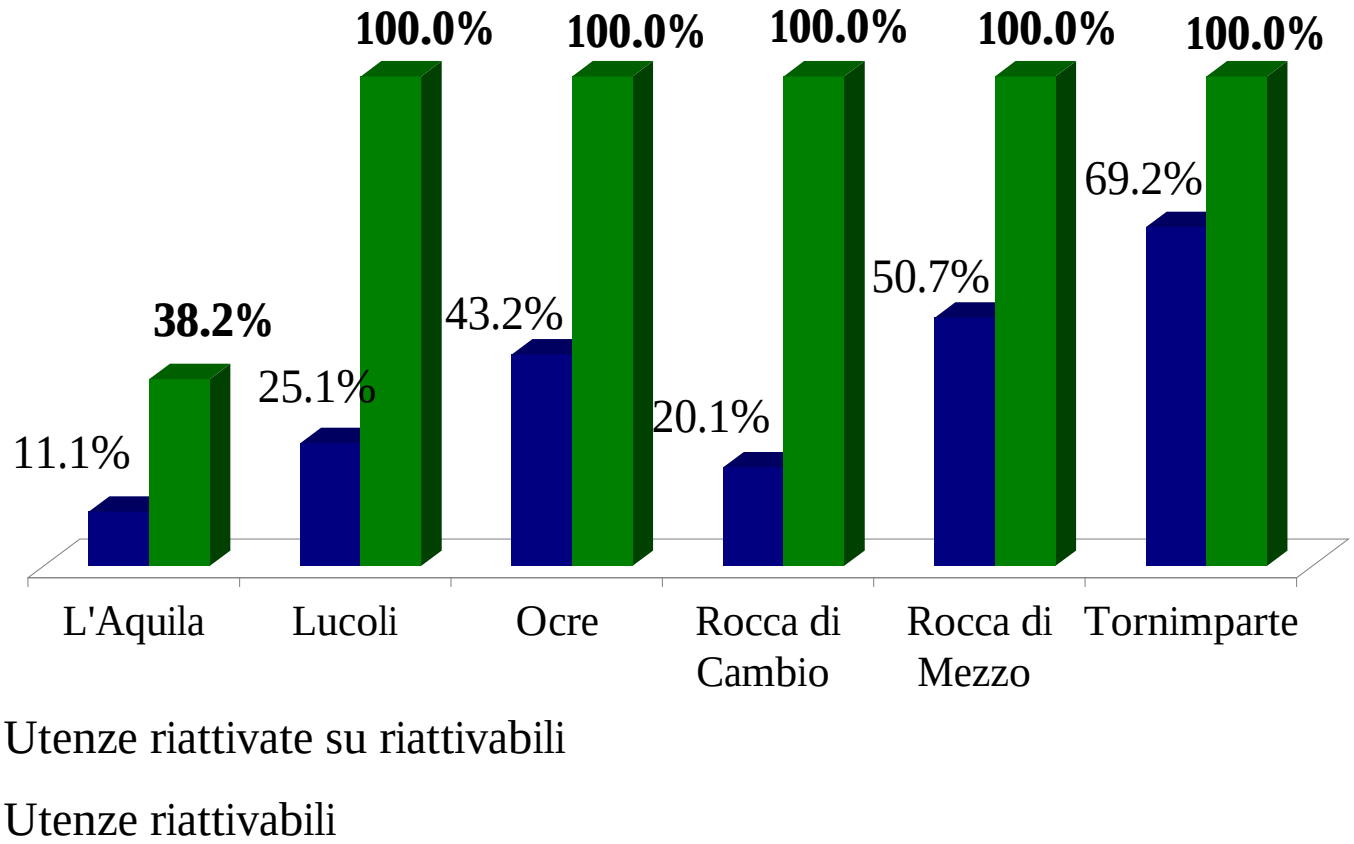
1) seal verification;
2) nitrogen check;
3) repair of damaged pipes and/or valves;
4) reopening.



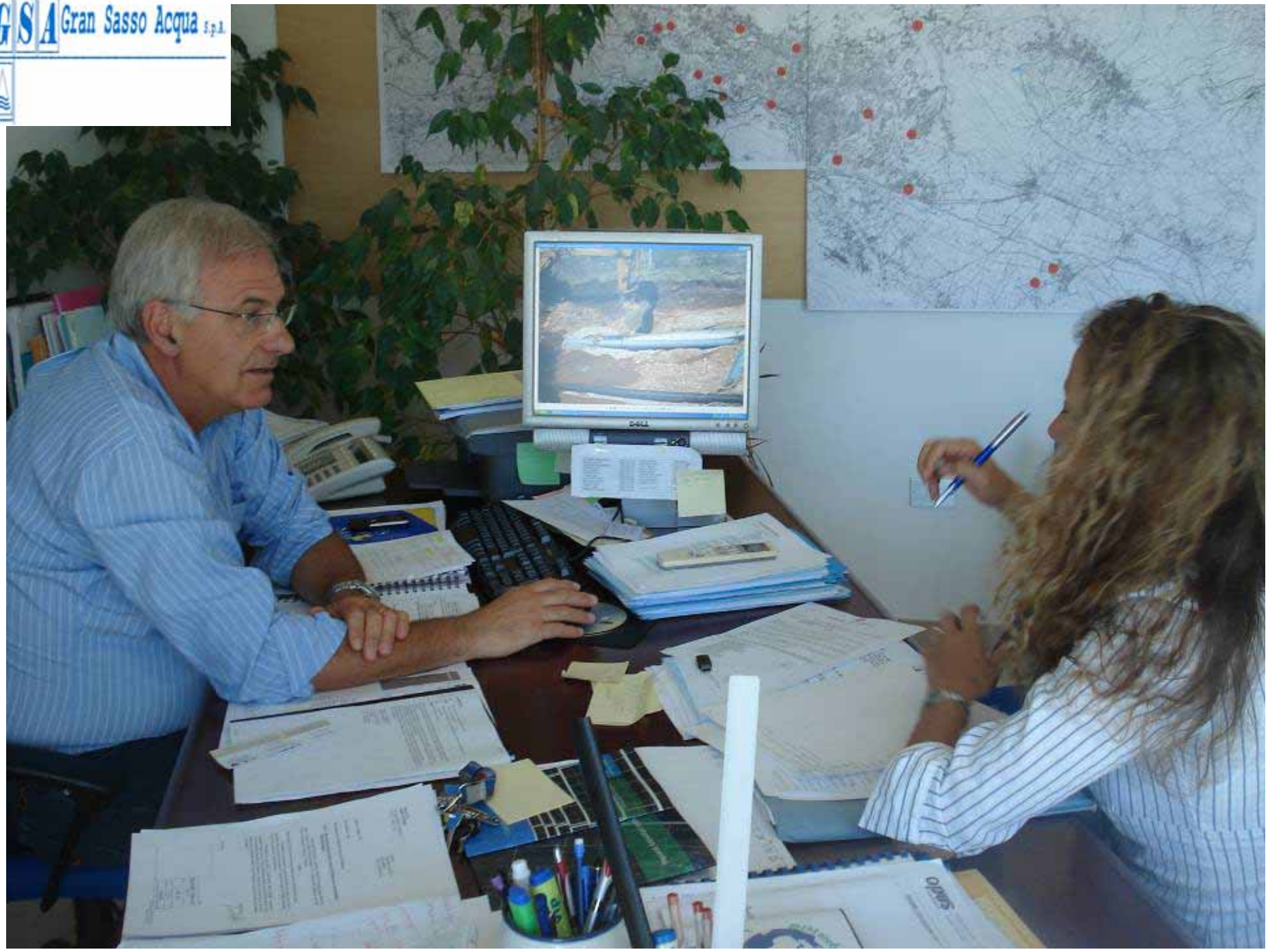
Gas Network

Single End-User Recconnection

1) safe dwelling (A after AeDES survey);
2) leak-tightness checking;
3) operative test of the equipment;
4) smoke test.



GSA Gran Sasso Acqua s.p.a.

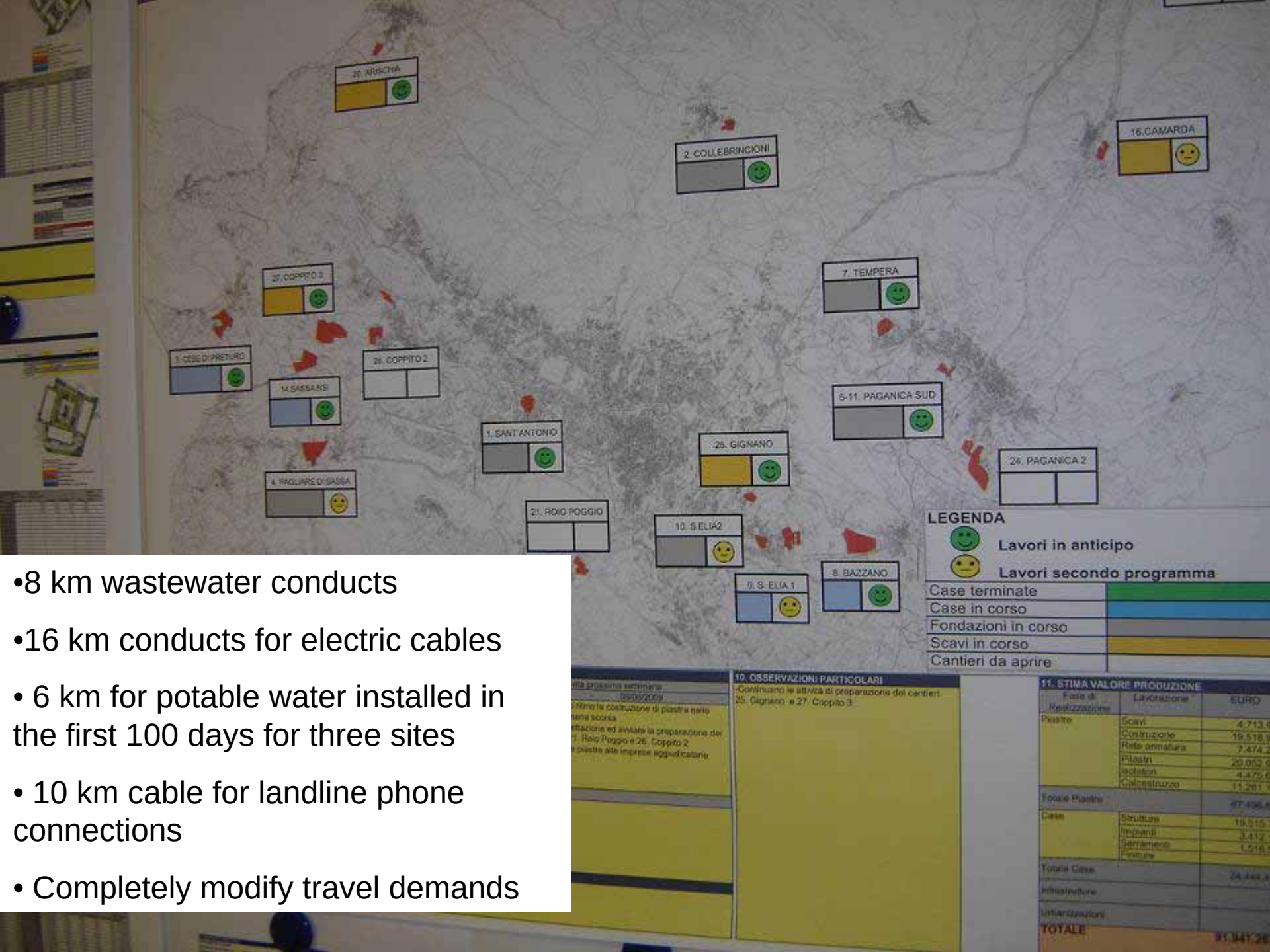


Water Network

A RESILIENT RECOVERY

Temporary Accommodation: C.A.S.E. Project


PROGETTO C.A.S.E.
REALIZZAZIONE DI ABITAZIONI SISMICAMENTE ISOLATE
RAGGRUPPAMENTO TEMPORANEO DI IMPRESE
Presidenza del Consiglio dei Ministri
Dipartimento della Protezione Civile
Comune di L'Aquila
184 Buildings – 4600 Shelters
1.800 mq: la superficie abitabile di una piastra, che poggia su 40 isolatori sismici
c.a.s.e.



- 8 km wastewater conducts
- 16 km conducts for electric cables
- 6 km for potable water installed in the first 100 days for three sites
- 10 km cable for landline phone connections
- Completely modify travel demands


NOLEGGIO

Temporary Accommodation: M.A.P. Project

The G8 meeting

From La Maddalena to L'Aquila


FROM LA MADDALENA TO L'AQUILA
G8


FROM LA MADDALENA TO L'AQUILA
G8


FROM LA MADDALENA TO L'AQUILA
G8
PROTEZIONE CIVILE NAZIONALE


FROM LA MADDALENA TO L'AQUILA
G8
you are here


The Art of Italian Expertise


STANZA
SISMICA
VIETATO AVVICINARSI
DISTANZA DI SICUREZZA 2 m. - ORGANI IN MOVIMENTO
PROTEZIONE CIVILE
NAZIONALE


Simulatore sismico "Città sismica"
Seismic simulator "Seismic town"

L'Aquila Will Rise Again

LESSONS FOR NZ?

Lessons from NZ Lifeline Forum 2009!

1. Robust Physical Infrastructures and Structures and Network Redundancy
2. Coordination Arrangements and Common Mapping Platform accessible at National Level
3. Back-up Arrangements
4. Resilience as a Decision Making Principle and Resilience in the Decision Making Process