RAN recent and future development

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Dipartimento della Protezione Civile

Antelope users group meeting Ljubljana, Slovenia, 7-9 May 2018

SUMMARY

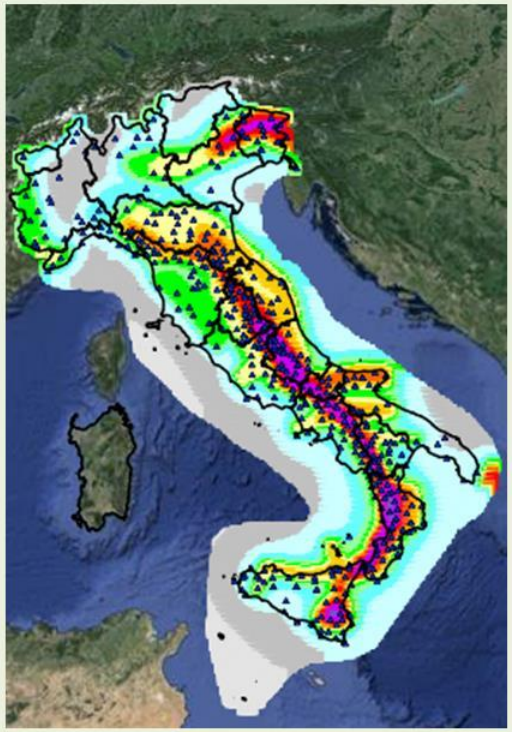
- IMPROVEMENT OF DATA SECURITY AND DATA CENTER OPERATIONAL CONTINUITY
- CURRENT STATE IN RAN – OSS NETWORKS INTEGRATION
- IMPROVING DATA SHARING

IMPROVEMENT OF DATA SECURITY AND DATA CENTER OPERATIONAL CONTINUITY

RAN NETWORK

RAN (FDSN code **IT**) includes 19 stations of regione Calabria and 3 stations of regione Veneto (ARPAV) maintained by DPC.

RAN NETWORK VS SEISMIC HAZARD MAP

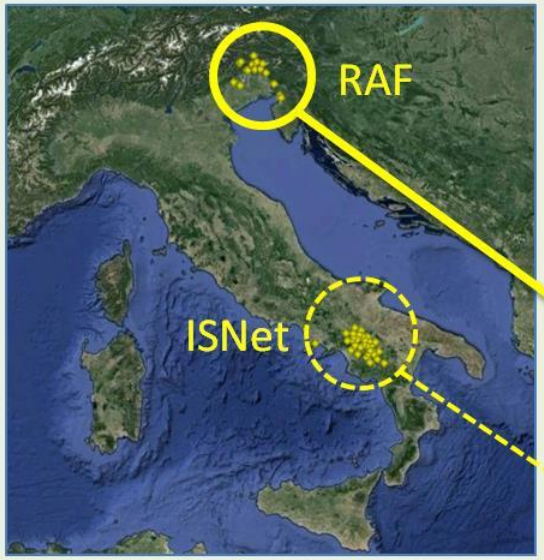


▲ - *RAN stations (573)*

- 0 to 0.025
- 0.025 to 0.050
- 0.050 to 0.075
- 0.075 to 0.100
- 0.100 to 0.125
- 0.125 to 0.150
- 0.150 to 0.175
- 0.175 to 0.200
- 0.200 to 0.225
- 0.225 to 0.250
- 0.250 to 0.275
- 0.275 to 0.300

PGA (g) with a 10% probability of exceedance in 50 years (i.e. 475 years return time). Calculated for stiff type soil or rock (class A soil)

INTEGRATED NETWORKS



RAF network - 22 stations
***FDSN** code "**RF**"*
http://rtweb.units.it/

ISNet network
***FDSN** code "**IX**"*
DPC is working to renew the agreement

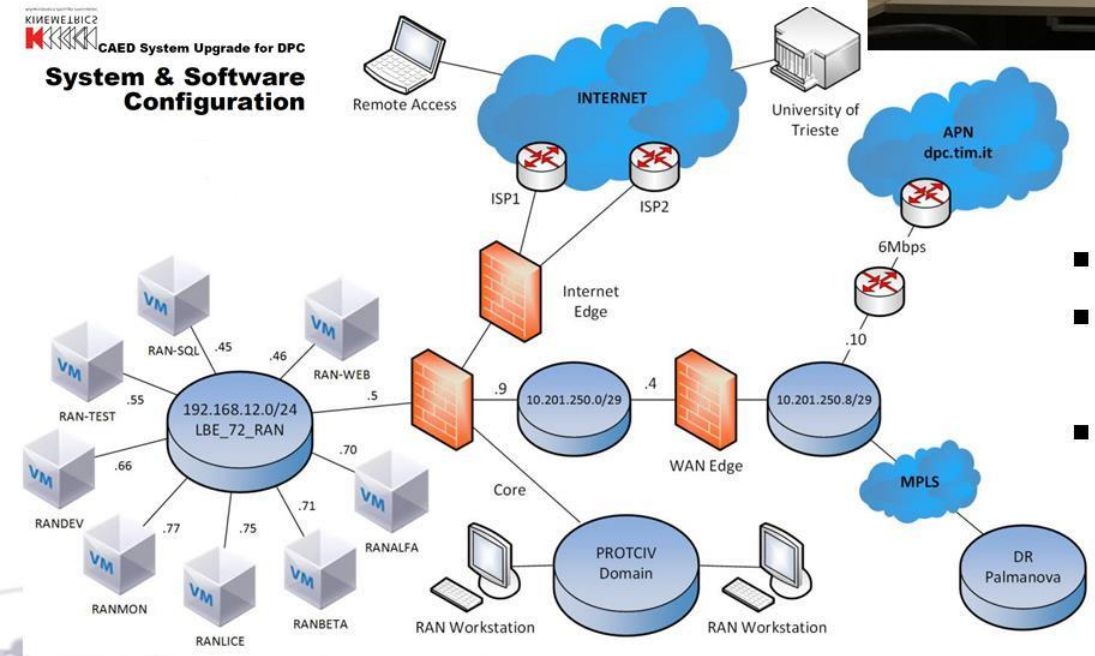
RAN data center collects strong motion data also from **RAF** and **ISNet** networks

RAN NETWORK – DATA CENTER

- at DPC headquarter in Rome
- fully virtualized to accomplish the Operational Continuity Plan required by law
- embedded in DPC infrastructure
- Antelope ver. 5.7

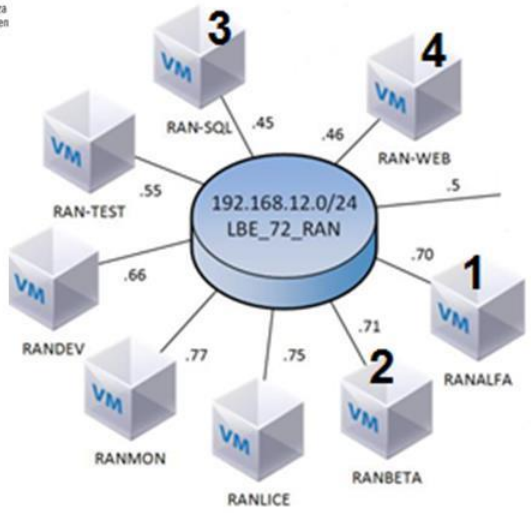
CAED System Upgrade for DPC

System & Software Configuration

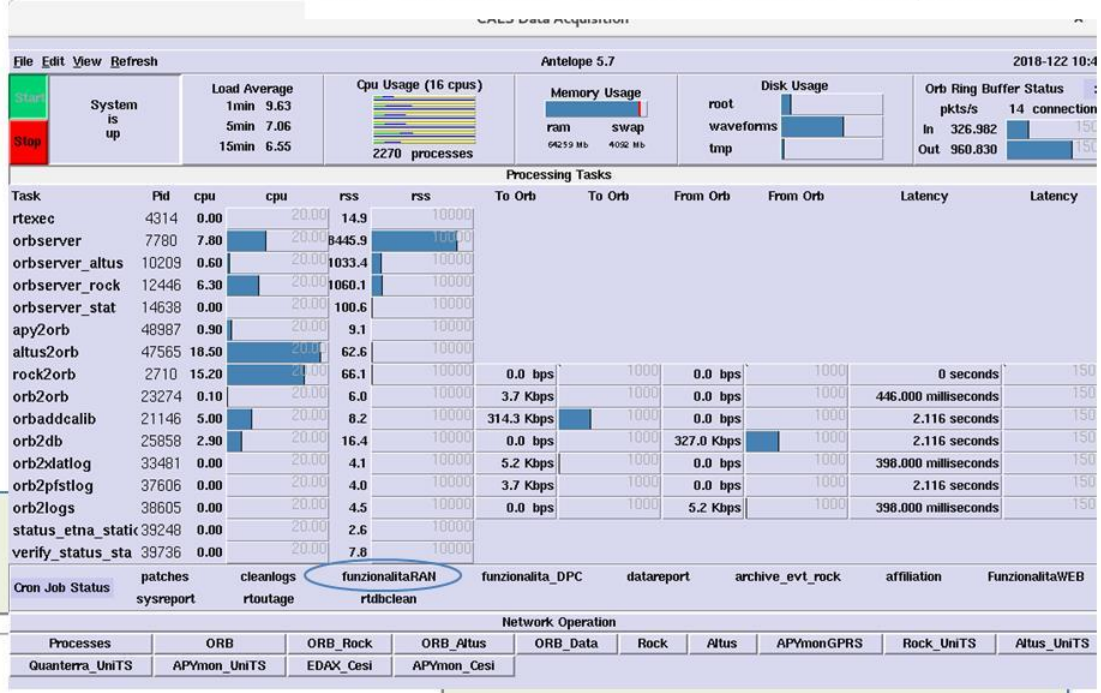


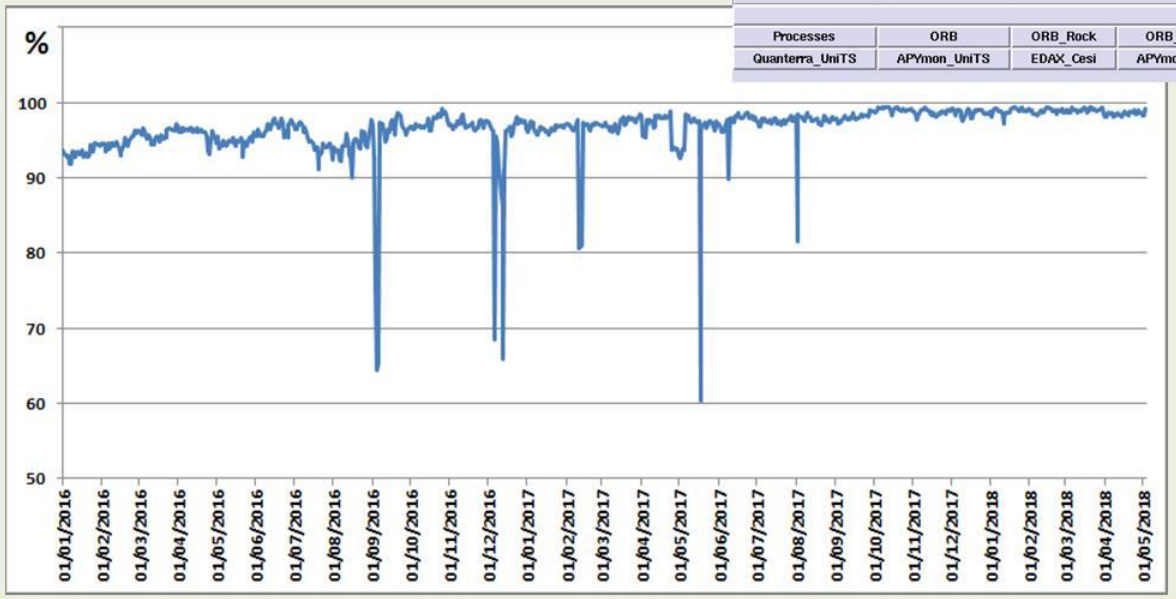
- Dedicated 2G/3G APN
- Data exchange (import & export) with University of Trieste
- Disaster Recovery in Palmanova (FVG)

RAN NETWORK – DATA CENTER



1. RANALFA ANTELOPE DATA ACQUISITION



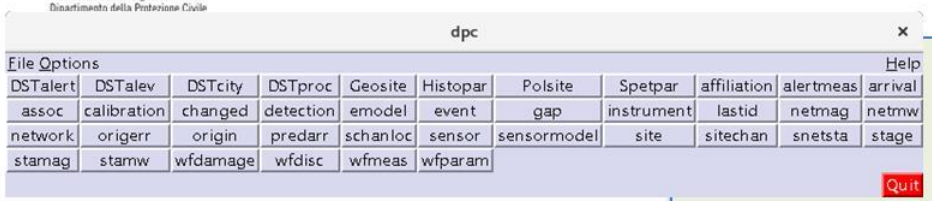


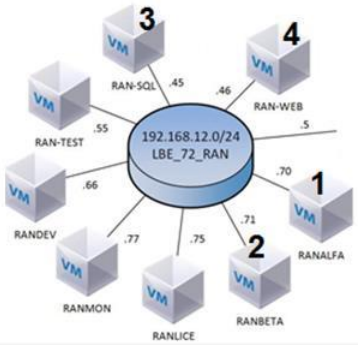
Network functionality (%)

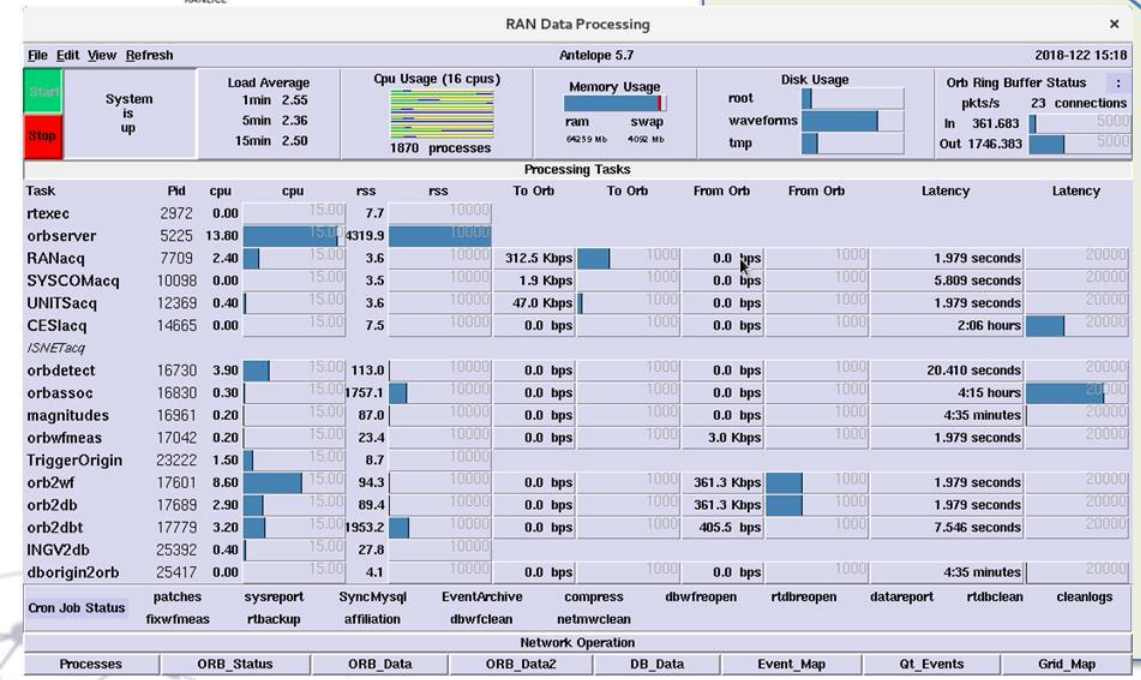
Low levels are associated to DPC infrastructure troubles

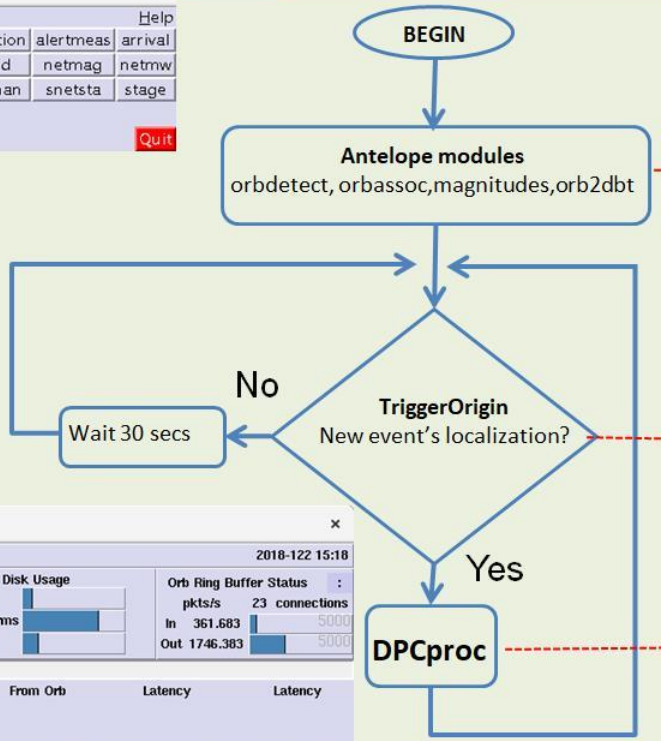
RAN NETWORK – DATA CENTER

2. RANBETA ANTELOPE DATA PROCESSING





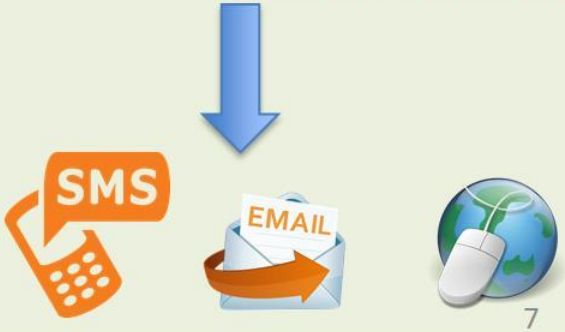




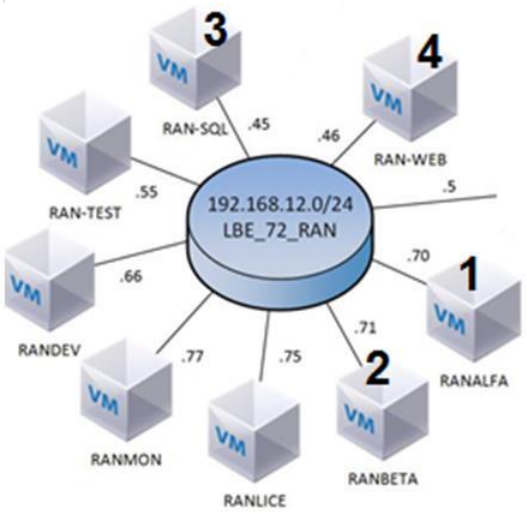
Antelope modules orbdetect, orbassoc, magnitudes and orb2dbt are always running waiting for locating a new event

TriggerOrigin program is always running and every 30 secs check for a new origin. In case of a new origin is present starts the procedure **DPCproc.**

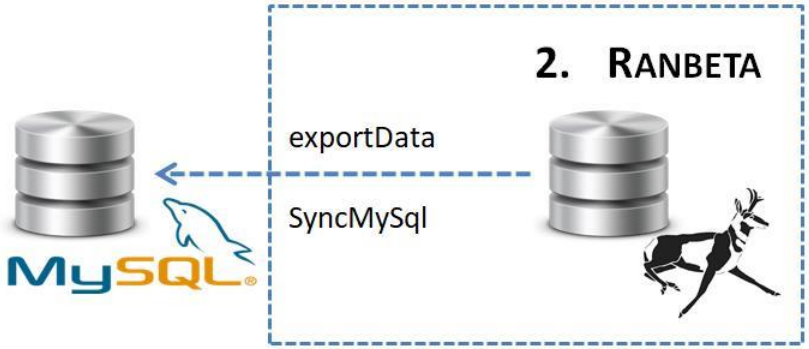
The core part of **DPCproc** is **dbmw** software module , implemented by UNITS, that calculate several parameters of seismic event and recorded waveforms



RAN NETWORK – DATA CENTER

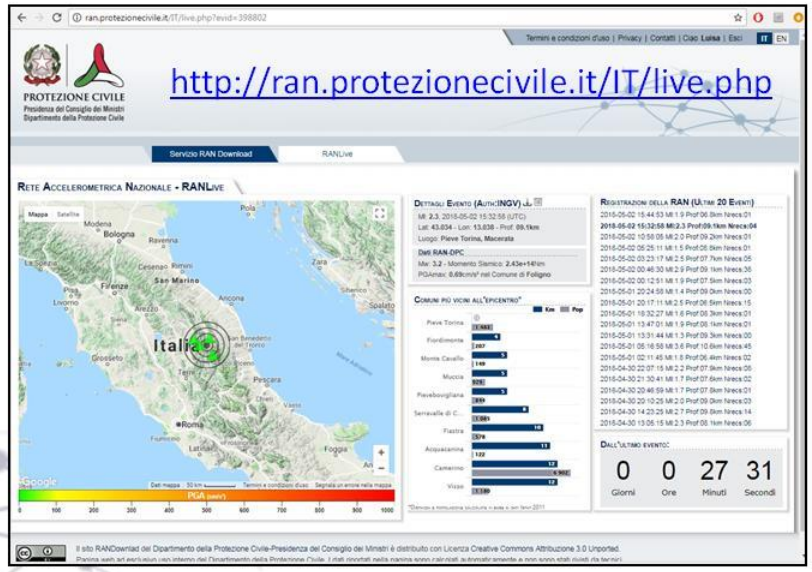


3. RAN-SQL RAN WEB DATABASE

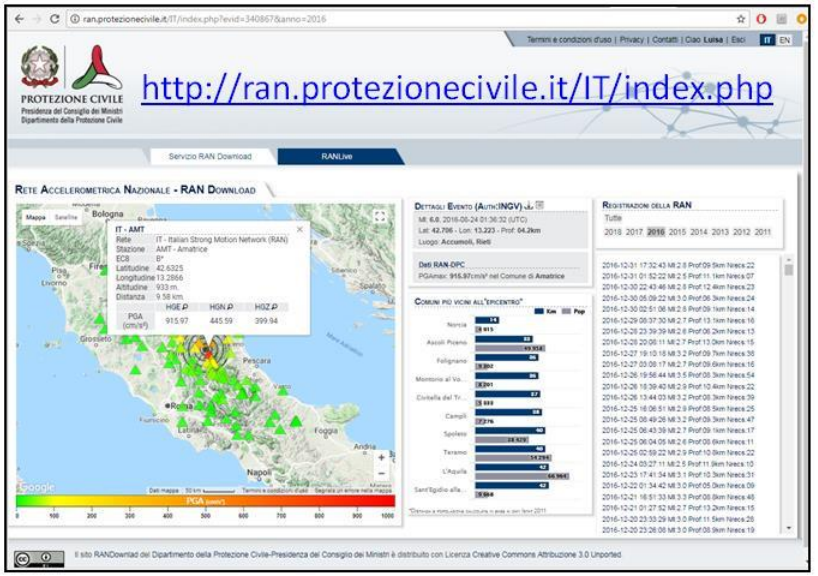


4. RAN-WEB RAN WEB SITE

RAN live (restricted access)



RAN download (public access)



CURRENT STATE IN RAN – OSS NETWORKS INTEGRATION

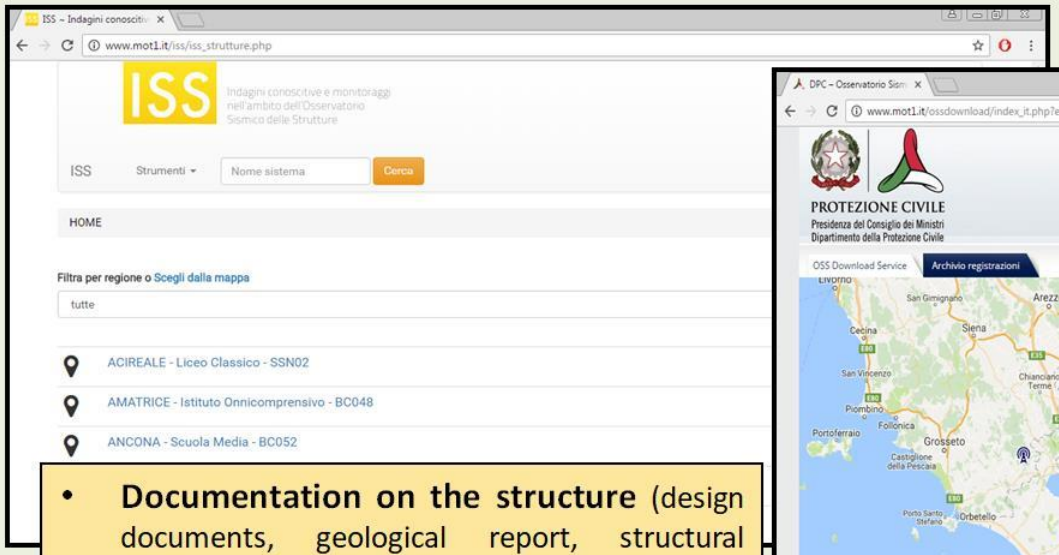
PROTEZIONE CIVILE
Presidenza del Consiglio dei Ministri
Dipartimento della Protezione Civile

OSS NETWORK

www.protezionecivile.gov.it

	STRUCTURES	162
	BRIDGE	7
Hospital	HOSPITAL	30
School	SCHOOL	70
Government	CITY HALL	29
	OTHER	21
	DAM	5

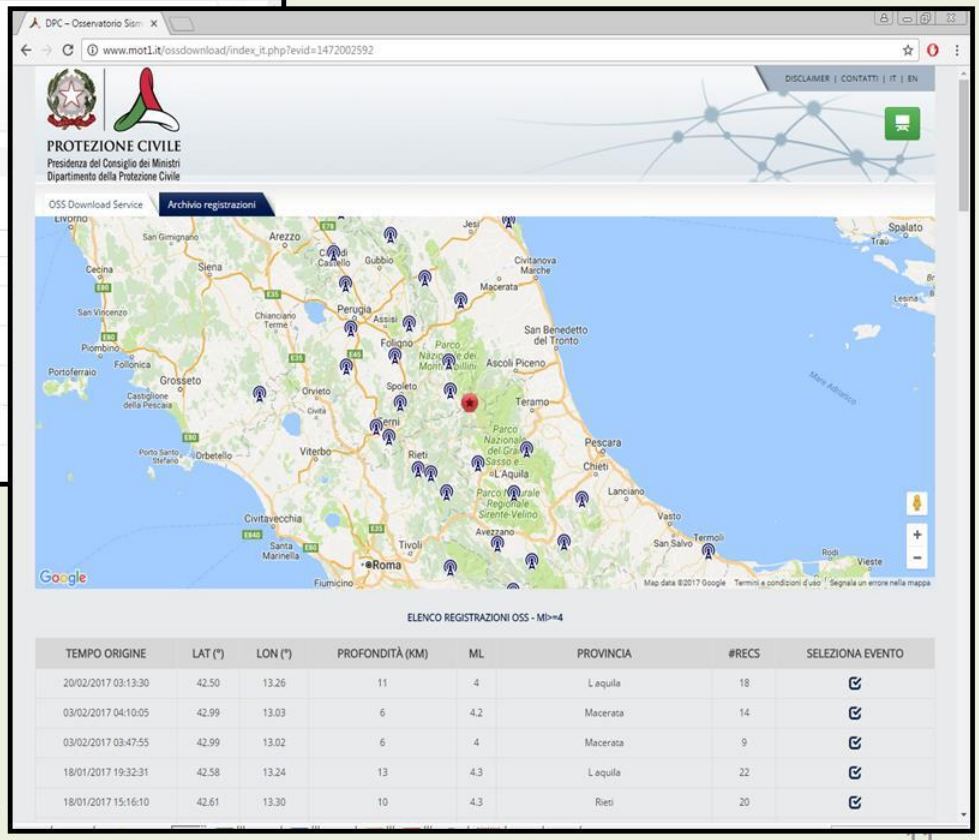
ISS http://www.mot1.it/iss/iss_strutture.php



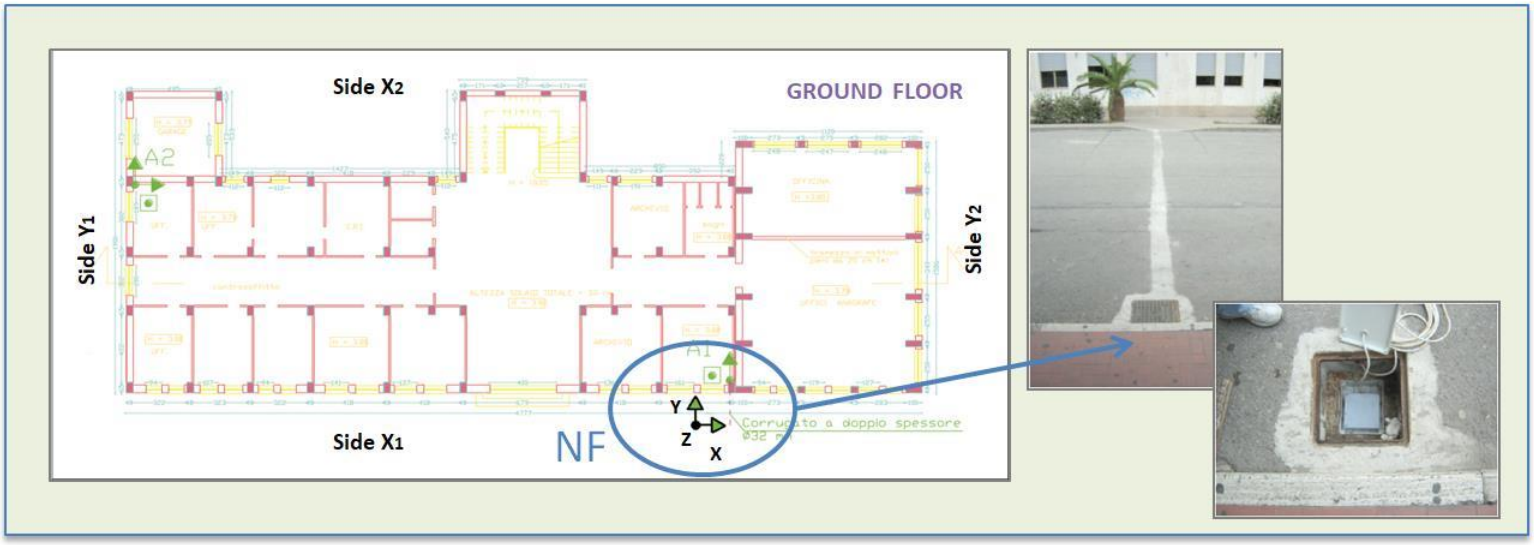
- **Documentation on the structure** (design documents, geological report, structural assessment)
- **Results of geometric reliefs and non-destructive surveys**
- **Results of experimental modal analysis**
- **Numerical models** (linear, non–linear)
- **Strong motion waveforms** (associated to monitored structure)

OSS download

http://www.mot1.it/ossdownload



SOV - Soverato *Town hall* building (monitored with 19 sensors)



The “near field” (NF) 3-component sensors of OSS monitoring systems are installed in a similar condition to many RAN stations, that are close to or at the basement of buildings

RAN STATIONS - EXAMPLES

AMT - Amatrice (Free field)

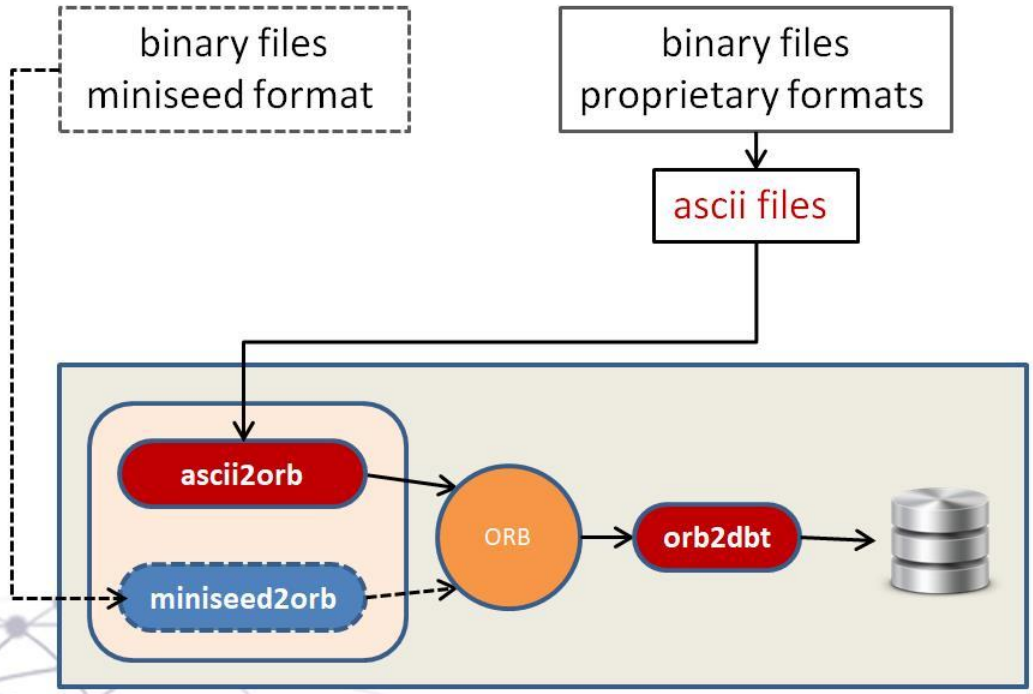
RQT - Arquata del Tronto (inside ENEL's building)

NOR - Norcia (at building's basement)

VRP - Vairano Patenora (close to building)

The OSS has a data center separated from RAN data center.

The OSS strong motion instruments are provided by several companies the original data from modern instruments are in miniseed format but they are mainly in binary proprietary format. The data in binary proprietary format are also provided in ascii, in a format read by ascii2orb program.



ascii file

```
SERIAL=4010                 # IDENTIFICATIVO DI SERIE DATALOGGER
CHANNEL=NF-Y                # IDENTIFICATIVO CANALE OSS
TIME=2015/11/17 7:13:09.735 # TEMPO PRIMO CAMPIONE
NSAMPLE=18000               # NUMERO DI CAMPIONI
SAMPLING= 200               # FREQUENZA DI CAMPIONAMENTO
DYNAMIC=24                  # DINAMICA 16,18,24,..
SEGTYPE=A                   # TIPO SENSORE: A=ACC. V=VELOC.
VPP=10                      # FONDO SCALA PICCO PICCO. +/-5v = 10v
SENSIBILITY=1.015           # COSTANTE DI TRASDUZIONE V/g
GAIN=1                      # GUADAGNO
USER1=                      # COMMENTI 64 CARATTERI X ANTELOPE
USER2=                      # COMMENTI 64 CARATTERI X ANTELOPE
INFO1=                      # ULTERIORI INFORMAZIONI
INFO2=

-1532                       # DATI IN COUNT
-1538
......
......
SERIAL=4010                 # IDENTIFICATIVO DI SERIE DATALOGGER
CHANNEL=NF-X                # IDENTIFICATIVO CANALE OSS
.......
.......
SERIAL=4010                 # IDENTIFICATIVO DI SERIE DATALOGGER
CHANNEL=NF-Z                # IDENTIFICATIVO CANALE OSS
.......
.......
```

OSS - RAN INTEGRATION

- More than 60 NF sensors of OSS network are already acquired in Antelope
- For these sensors the dbmaster is completed
- The dbmw software has been modified by UNITS to elaborate OSS data together with RAN data, including the rotation of OSS components.
  OSS network use X, Y as local coordinate system, while RAN network use geografic coordinates lat N, lon E

IMPROVING DATA SHARING

A seedlink server is ready for sharing data in streaming

It will be available to the public shortly on

http://ran.protezionecivile.it/

Thank you