Table-ronde franco-italienne
17 septembre 2024
« Mieux (re-)construire autour du risque sismique »

Tavola-rotonda franco-italiana
17 settembre 2024
« (Ri)costruire meglio intorno al rischio sismico »

Association Française pour la Prévention des Catastrophes Naturelles et Technologiques
AFPCNT
Mieux comprendre, mieux prévenir

Soutenu par
MINISTÈRE DE LA TRANSITION ÉCOLOGIQUE ET DE LA COHÉSION DES TERRITOIRES
Liberté
Égalité
Fraternité

Session 1 - Feedback from French and Italian local councillors

Deborah Visconti
Mayor of Sant'Eusanio Forconese (IT)

Giovanni Berardinangelo
Vice-mayor of Sant'Eusanio Forconese (IT)

Olivier Peverelli
Mayor of Le Teil (FR)

Association Française pour la Prévention des Catastrophes Naturelles et Technologiques

AFPCNT

Mieux comprendre, mieux prévenir

Session 1

Event report: description of the chronology of decisions made and actions taken as a result of the event in the short and medium term

Speaker Dr. Giovanni Berardinangelo

Vice-Mayor Municipality of Sant'Eusanio Forconese

Soutenu par

MINISTÈRE DE LA TRANSITION ÉCOLOGIQUE ET DE LA COHÉSION DES TERRITOIRES

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EARTHQUAKE APRIL 6, 2009

On April 6, 2009, at 3:32 a.m., a violent earthquake with a magnitude of 5.9 on the Richter scale (magnitude moment 6.3), depth of 8.8 kilometers, severely affected multiple municipalities, including L'Aquila and Sant'Eusanio Forconese with the hamlet of Casentino.
There has been 309 victims and 1,500 injured; no casualties in the communities of Sant'Eusanio and Casentino

POST EARTHQUAKE EMERGENCY MANAGEMENT - SUMMARY OF THE MAYOR'S ACTIONS IN THE SHORT TERM

The mayor, as the "Civil Defense Authority."

- Implements the civil defense plan for emergency management;
- Adopts eviction orders for uninhabitable dwellings;
- Demarcates the so-called "red zone."
- Coordinates civil defense activities taking place in its territory;
- Shall take all appropriate measures to protect public and private safety;
- Adopt additional measures stipulated by the specific regulatory provisions related to the earthquake of April 6, 2009.

EMERGENCY HOUSING MANAGEMENT

In Sant'Eusanio and Casentino, with a population of about 370, two tent cities were set up in the aftermath of the earthquake (with the support of the National Department of Civil Defense and volunteers) to house evacuees.

With the adoption of the specific regulatory provisions, in agreement with the Civil Defense, in August 2009, work began on the construction of 107 temporary housing modules (73 in S. Eusanio and 34 in Casentino) for those who had lost their main home; in the first half of December 2009 and the second half of January 2010, the 107 temporary housing modules were assigned to those entitled to them.

MAIN REGULATORY REFERENCES FOR POST-EARTHQUAKE RECONSTRUCTION APRIL 6, 2009

- Decree Law No. 39/2009, converted with amendments into Law No. 77/2009;
- Main Ordinances of the Presidency of the Council of Ministers, implementing Law No. 77/2009:
  - O.P.C.M. No. 3753 of 06/04/2009 (adoption of "Aedes" sheet) for verification of agibility of buildings:
    outcome "a" - habitable property;
    outcome "b" - temporarily uninhabitable property;
    outcome "c" - partially uninhabitable property;
    outcome "d" - temporarily uninhabitable to be reviewed in depth;
    outcome "e" - building uninhabitable;
    outcome "f" - building uninhabitable due to external hazard;
  - O.P.C.M. No. 3778 of 06/06/2009 (procedure for housing reconstruction with outcome "a")
  - O.P.C.M. No. 3779 of 06/06/2009 (procedure for reconstruction of uninhabitable houses with outcome "b" and "c");
  - O.P.C.M. No. 3790 of 09/07/2009 (procedure for reconstruction of uninhabitable houses with outcome "e" - "heavy" reconstruction);
- Decree Law No. 83/2012 converted with amendments into Law No. 134/2012, which also established the U.S.R.C. and U.S.R.A.

RECONSTRUCTION OF PROPERTIES OUTSIDE THE HISTORIC CENTER: ACTIONS TAKEN IN THE SHORT TERM

- Securing uninhabitable properties to enable reopening of main road sections;
-surveys for the verification of the fitness outcomes of housing units located in the villages of Sant'Eusanio and Casentino, with possible following classification:

outcome "a" - habitable property;
outcome "b" - temporarily uninhabitable property;
outcome "c" - partially uninhabitable property;
outcome "d" - temporarily uninhabitable to be reviewed in depth;
outcome "e" - building uninhabitable;
outcome "f" - building uninhabitable due to external hazard;

-preliminary investigation and adoption of measures to grant the contribution for the uninhabitable properties located outside the historic centers of Sant'Eusanio Forconese and Casentino, for which the municipality of S. Eusanio F. provided for the preliminary investigation of the practices through its technical department without making use of the "Fintecna, Cineas and Reluis" supply chain (O.P.C.M. 3803 of Aug. 15, 2009), allowing them to return to their homes as early as 2010; for possible further study on this matter, we suggest "White Paper on Private Reconstruction Outside Historic Centers in the Municipalities Affected by the Abruzzo Earthquake of April 6, 2009," edited by Mauro Dolce and Gaetano Manfredi, (in particular, Chapter 2, p. 35 to p. 65, with contributions by: Dolce, Moroni, Manfredi, Fico, Prota, Di Ludovico, Masini, Bertani).

PROPERTY RECONSTRUCTION IN THE HISTORIC CENTER: ACTIONS TAKEN IN THE MEDIUM TERM

- Perimeter of historic centers and adoption of reconstruction plans for Sant'Eusanio (University of L'Aquila) and Casentino (University of Florence), with estimates of economic resources needed for private, public and underground reconstruction;
- Identification of building aggregates to be reconstructed;
- Establishment of consortia eligible to apply for reconstruction grants;
- for the reconstruction of houses and consortia located in historic centers, the regulations first provided for the preliminary investigation by the Territorial Reconstruction Offices and, subsequently, the preliminary investigation by the Special Reconstruction Office of the Crater Municipalities, with a grant order issued by the municipality;
- As of June 13, 2022 (end of term date), 90 reconstruction grants totaling 74,456,571.43 euros had been granted and, therefore, for a reconstruction of the historic centers in a very advanced stage, as evidenced in the following plans.

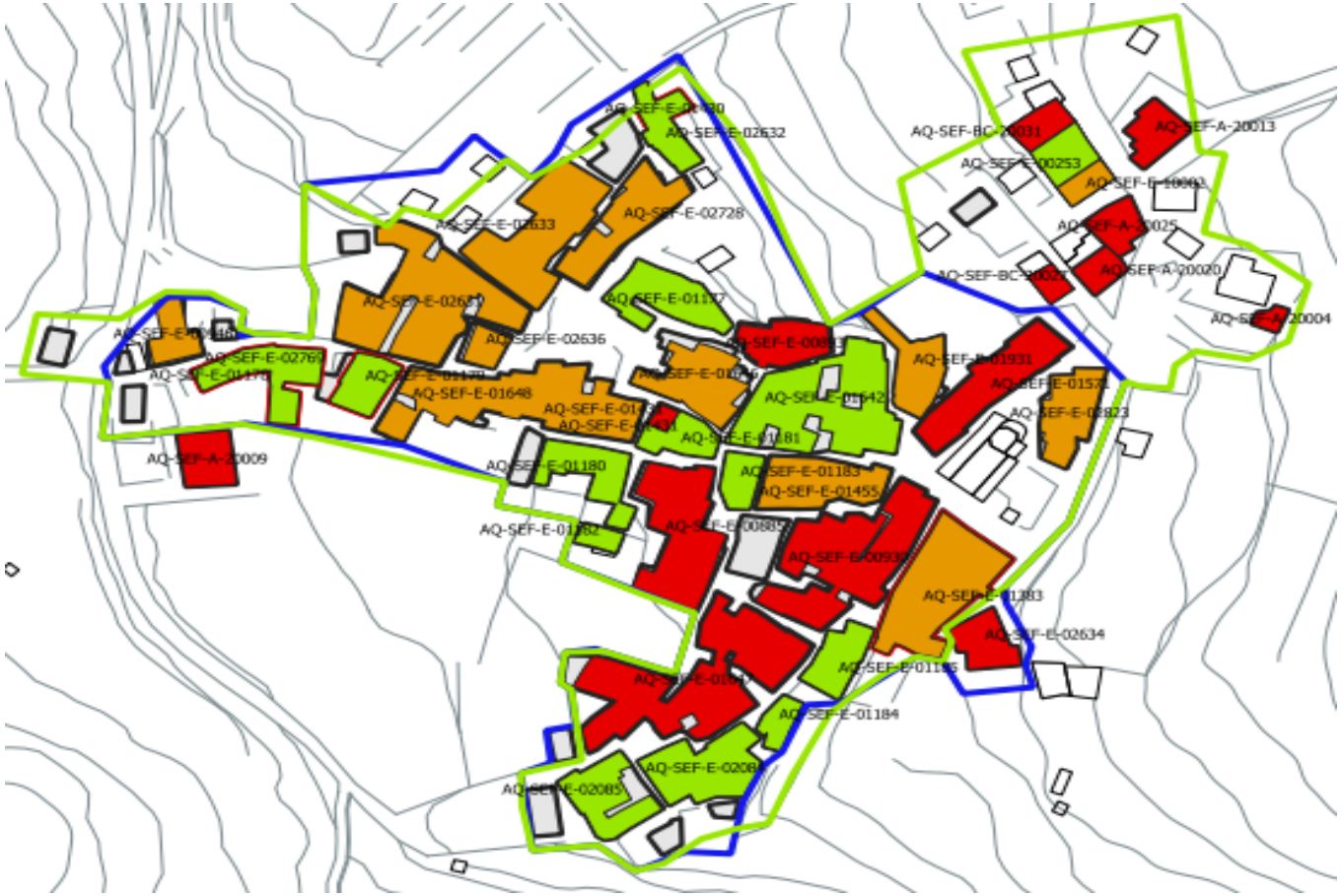
STATUS OF S. EUSANIO RECONSTRUCTION (U.S.R.C. DATA - UPDATED AS OF 08/27/2024)

Legend

- Submitted
- Validated
- Closed (works finished)
- Closed without validation1
- Expected intervention 2009 earthquake
- C.T.R.
- P.D.R. delimitation
- A Zone historical center

1By order of denial or archiving

CASENTINO RECONSTRUCTION STATUS (U.S.R.C. DATA - UPDATED AS OF 08/27/2024)



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- Expected intervention 2009 earthquake
- C.T.R.
- P.D.R. delimitation
- A Zone historical center

1By order of denial or archiving

Session 2 - Vulnerability reduction and public policies

Johanna Vieille
Natural hazards engineer
Office of geological and mining research (BRGM)

Mauro Dolce
Former General Director of the Italian Civil Protection / Professor of structural engineering and President of the ReLUIS inter-university consortium

Julien Rey
Project manager in charge of seismic and volcanic risks at the General Directorate for Risk Prevention of the French Ministry of Ecological Transition

Post-seismic reconstruction in Le Teil following the november 11th 2019 seismic event : zoom over building reconstruction

Authors: J. Vieille, C.Negulescu, N. Taillefer, L. Sautier, L. Lemaire

Géosciences pour une Terre durable
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BRGM, the French Geological Survey

A destructive earthquake: Le Teil, November 11, 2019, Mw 4.9

Activation of Emergency System of the French Association of Earthquake Engineering (AFPS)

MINISTÈRE DE LA TRANSITION ÉCOLOGIQUE ET DE LA COHÉSION DES TERRITOIRES
Liberté Égalité Fraternité

A willingness to study the reconstruction phase

A mission to quantify the progress of the process

Géosciences pour une Terre durable
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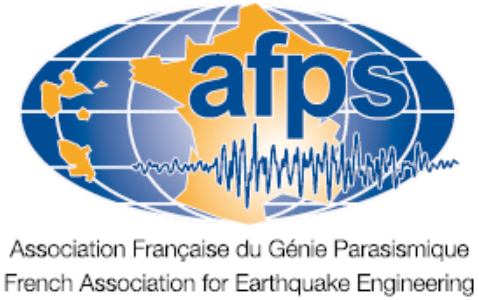
A multi-year project to keep pace with renovations

Involvement at several levels

An action made possible by numerous collaborations, including **strong local support**, as well as multidisciplinary thematic and technical approaches.

AFPS



La commune du Teil

Le collectif des sinistrés

Research teams

Context:

The earthquake affected a vulnerable and evolving region
8500 inhabitants, around 2800 residential buildings

Characteristics of the area before the earthquake
High social and economic vulnerability
Old and vulnerable buildings

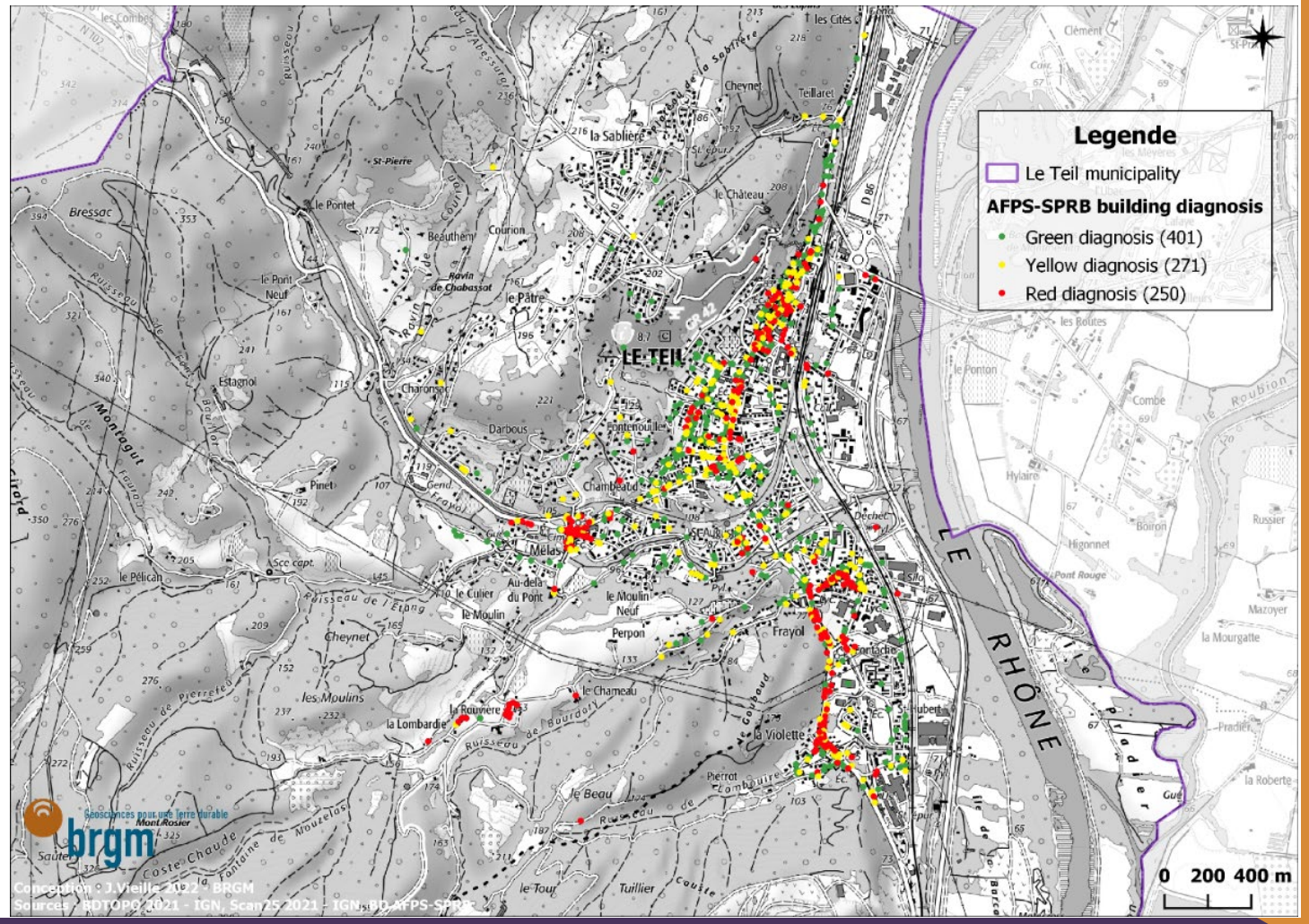
Impact of the November 11, 2019 earthquake
More than half of all buildings required an emergency diagnosis, and 521 (20%) were given a yellow or red diagnosis (danger)
850 danger orders for dwellings in buildings rendered unsafe
400 to be lifted by February 2021, approx. 250 to be lifted by February 2024

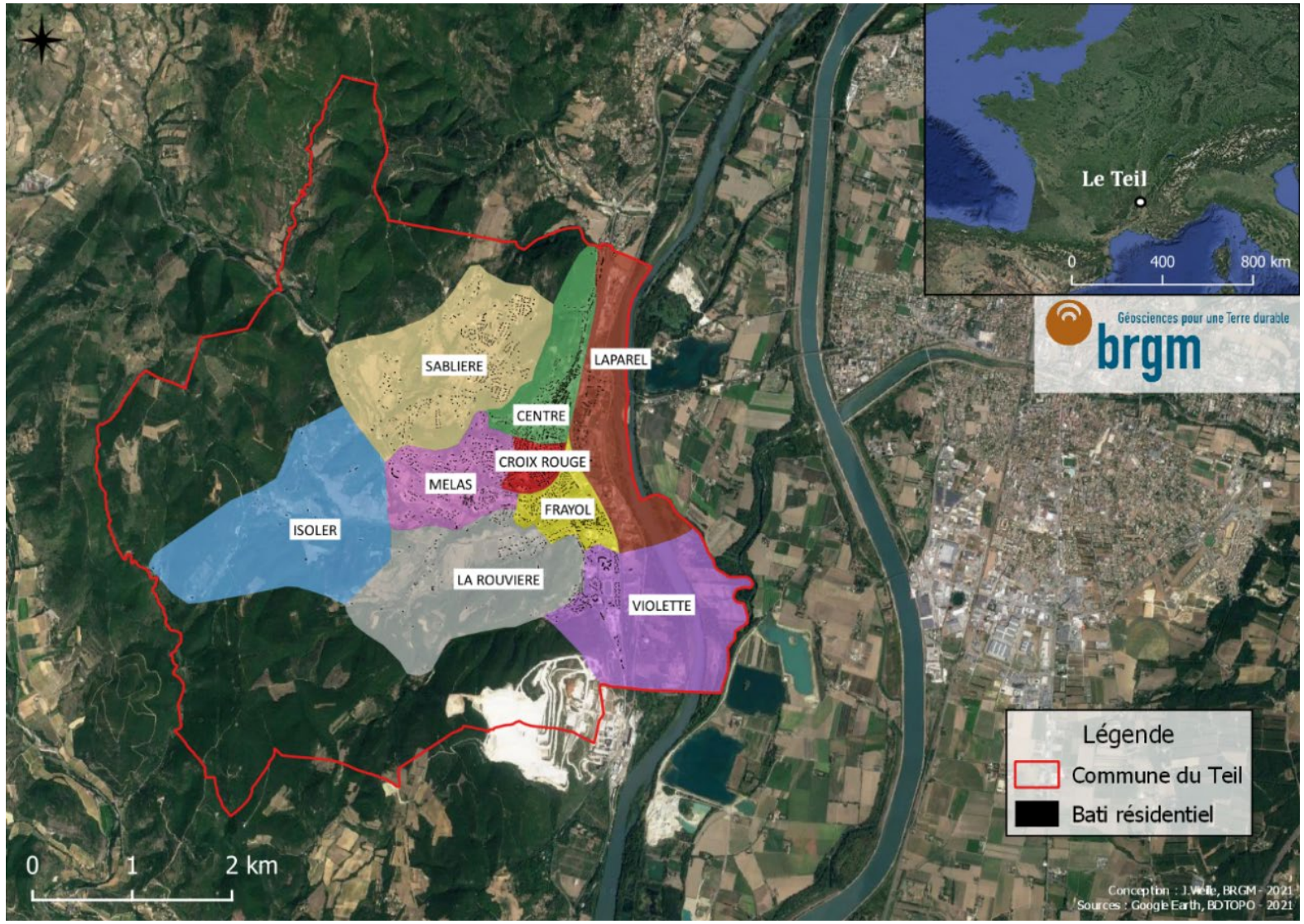
Institutional response -A prefect for reconstruction who:
coordinates the government's response
coordinates working groups between stakeholders: insurance companies, disaster victims, builders, etc.

Emergency inventories from the French Earthquake Engineering Association (AFPS - https://www.afps-seisme.org/URGENCE) and Departmental fire and rescue service (SDIS)

Description of the database of building diagnostics carried out by the AFPS and fire departments in the days following the earthquake

Diagnostics		
Green	Yellow	Red
401	272	249
inspected	Dangerous building	Collapse risk





The commune of Le Teil and its "districts" (non-administrative boundaries)

Le Teil municipality

Key figures

8,769 inhabitants in 2018 (source: INSEE)

84% primary residences,

14% vacant homes and

2% second homes

Historically vulnerable neighborhoods

"Urban form built lengthwise in a compact aggregate of buildings served by a long main street, today's Rue Kléber".

"tiny courtyards, staircases, raised thresholds of numerous superimposed dwellings with a more miserable appearance".

"the obvious inconvenience and unhealthiness of this old fabric. The neighborhood seems to have slowly deteriorated, turned in on itself, left to its own devices".

"the density is such that light is becoming a necessity".

Description of district "Mélas'' after PPA

"the oldest hamlet in the commune".

"massive buildings grouped on either side of the road".

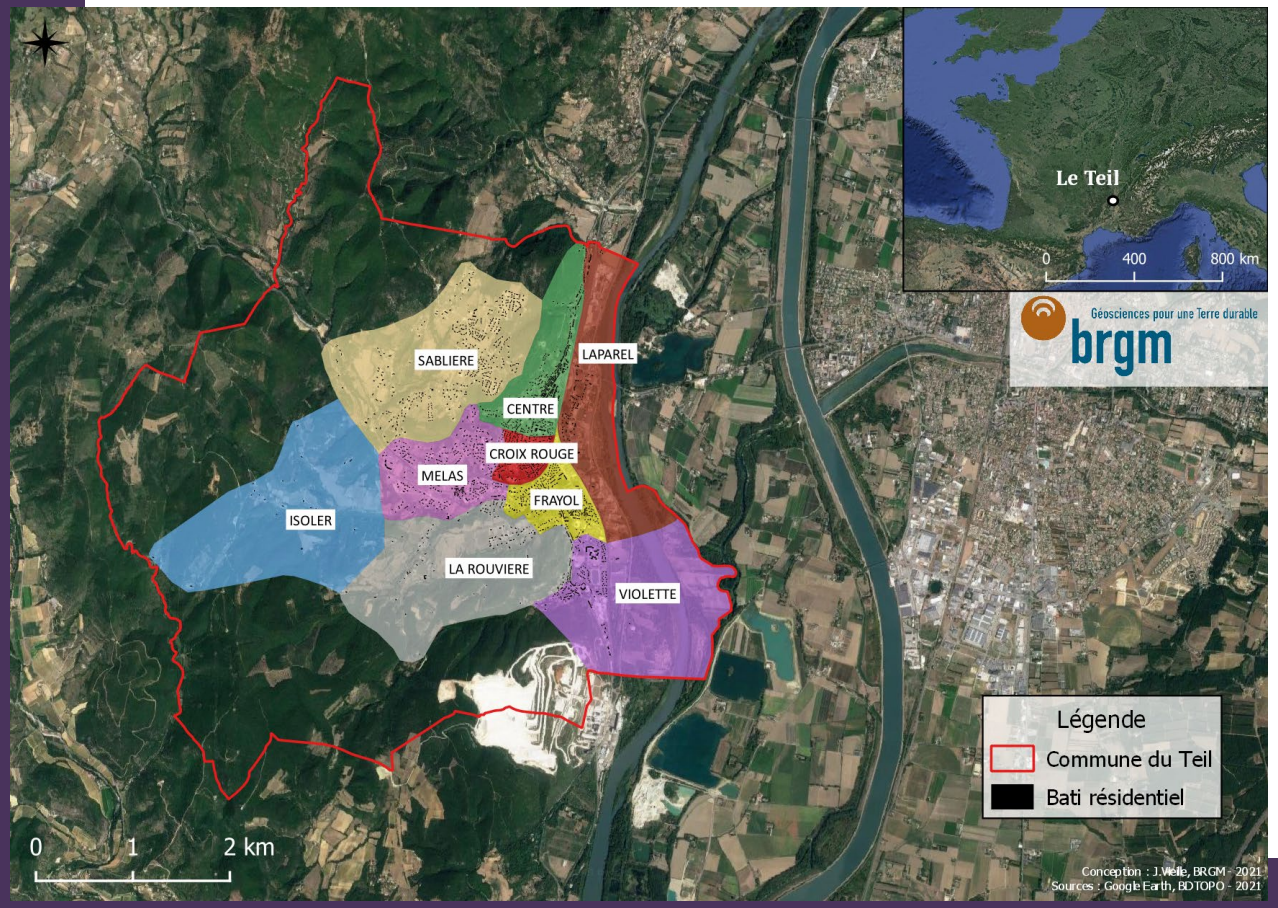
Description of district "Frayol'' after PPA

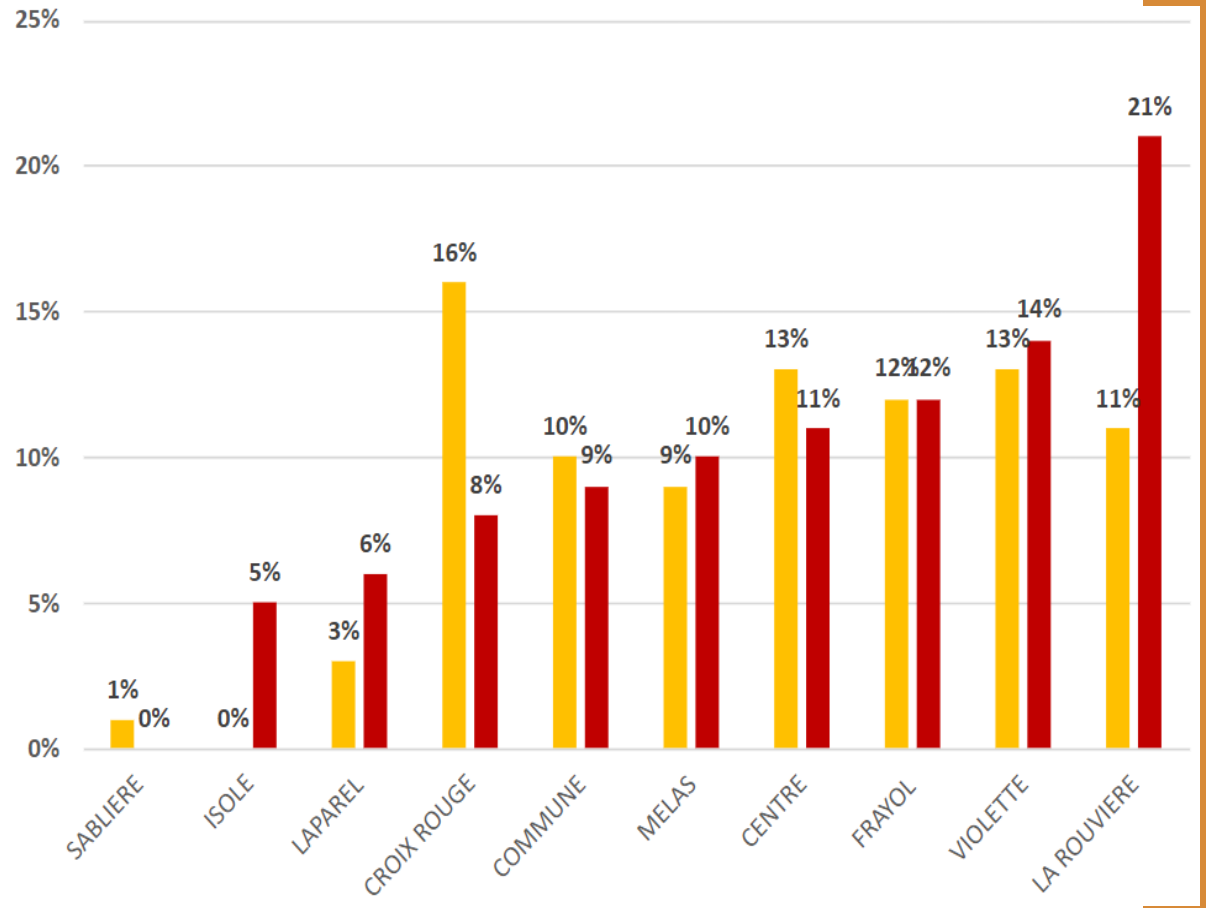
"group of imposing farm buildings and large dwellings squeezed together, served by a narrow main alley".

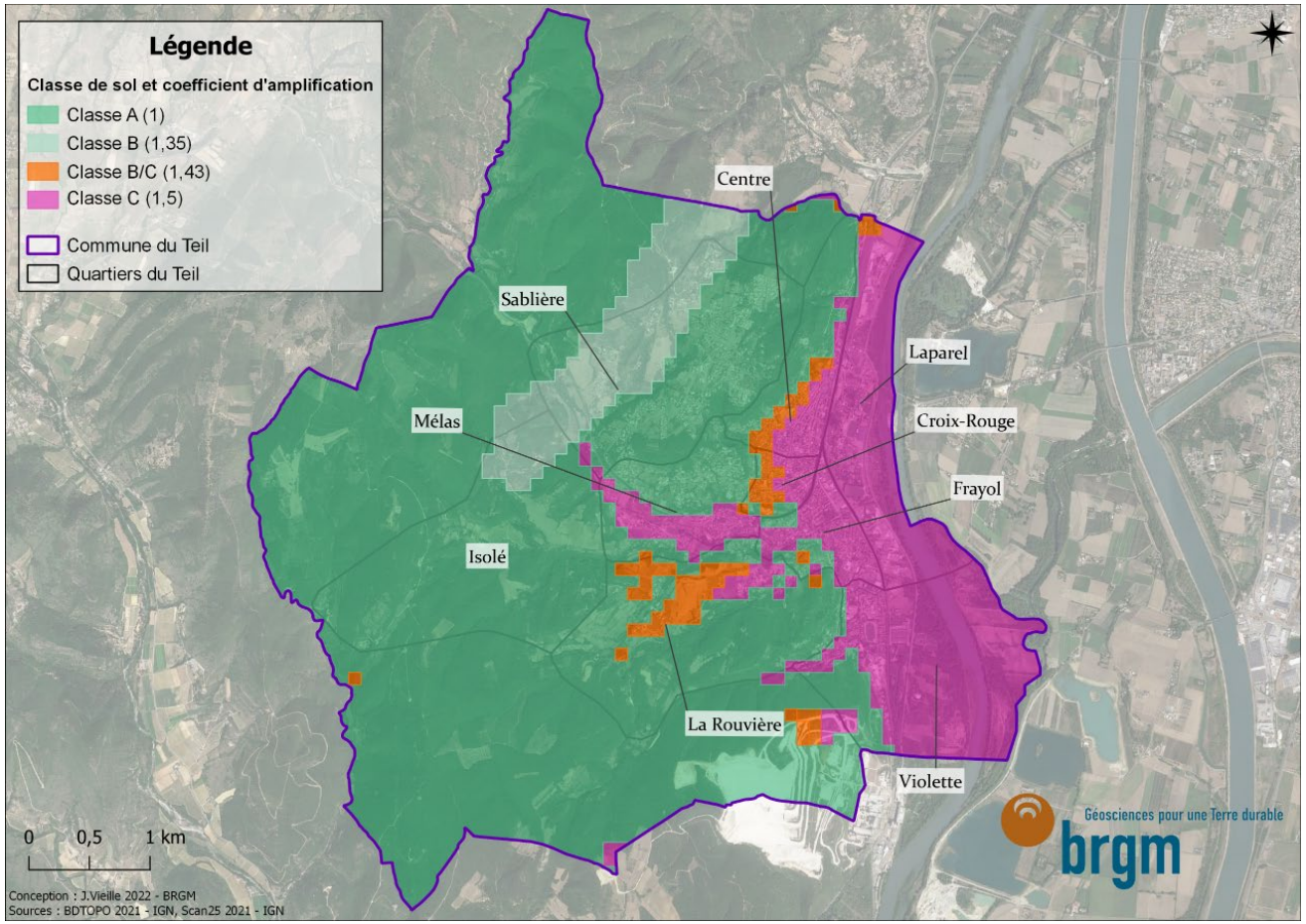
"incredibly dense forms amidst recent buildings scattered all around".

"old heart with no public spaces".

Distribution of diagnosis yellow and red





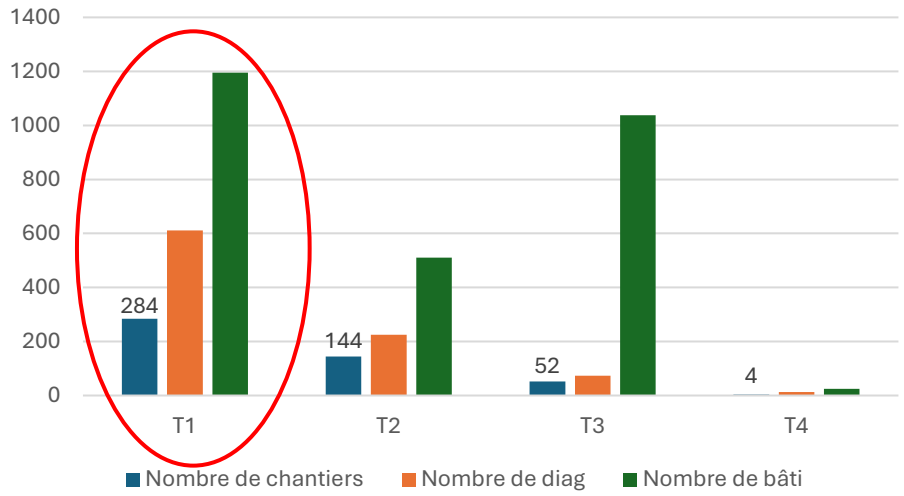


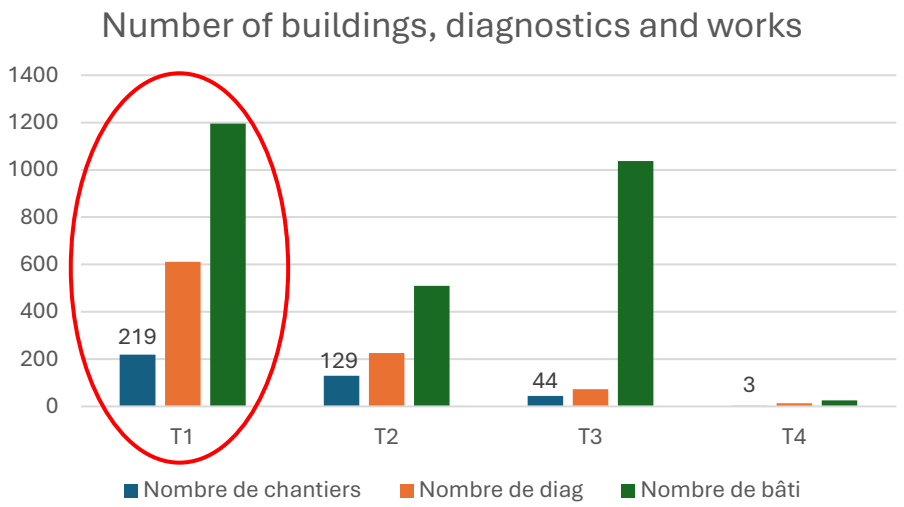
Aggravating site effects?

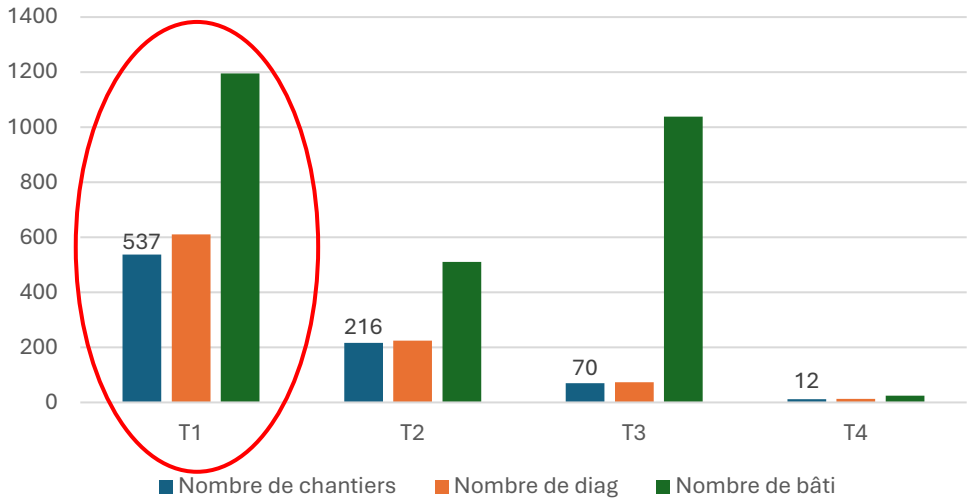
Site effects class and amplification (after CCR, 2016)

Soil Class	Amplification coef.	Number of diagnosis	Number of buildings	Ratio number of diagnosis/number of buildings
Class A	1	157	1038	0,15
Class B	1,35	2	53	0,04
Class B/C	1,43	146	356	0,41
Class C	1,5	624	1332	0,47

Reconstruction state
D+2 years,
D+3 years and D+4 years

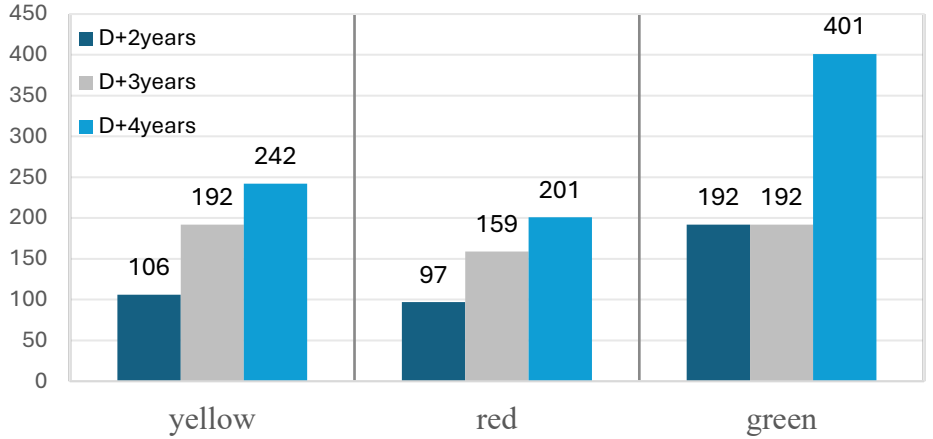




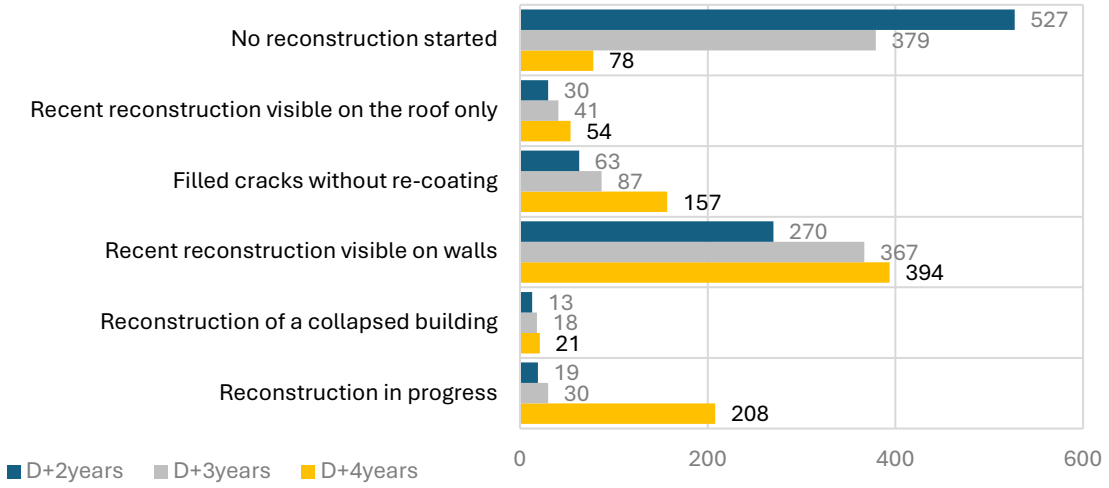


Reconstruction state D+2 years, D+3 years and D+4 years

Numbers of buildings renovated or in progress



Distribution of repairs in the municipality of Le Teil



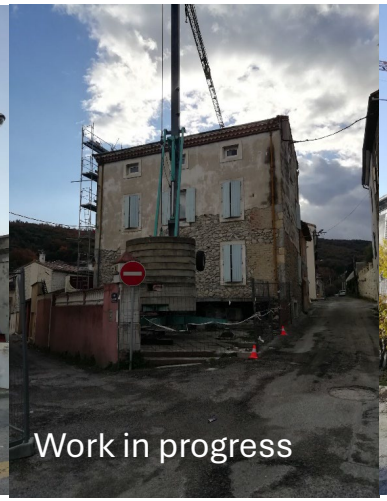
Indicators	References	D+2 years	D+3 years	D+4 years
Actual number of prohibition orders issued	**850** orders issued following the earthquake	400	332	**273***
Number of buildings having undergone work	Number of buildings in the diagnosis database : **922** buildings	395	543	**844**


Wall repair and renovation


Work in progress (walls)


Reinforcement with tie rods


Work not yet started


Work in progress


Cracks treatment


Roofing works

RC reconstruction

General view of the hamlet of La Rouvière

Masonry reconstruction

Demolition-reconstruction

2 civil engineering internships (M1)

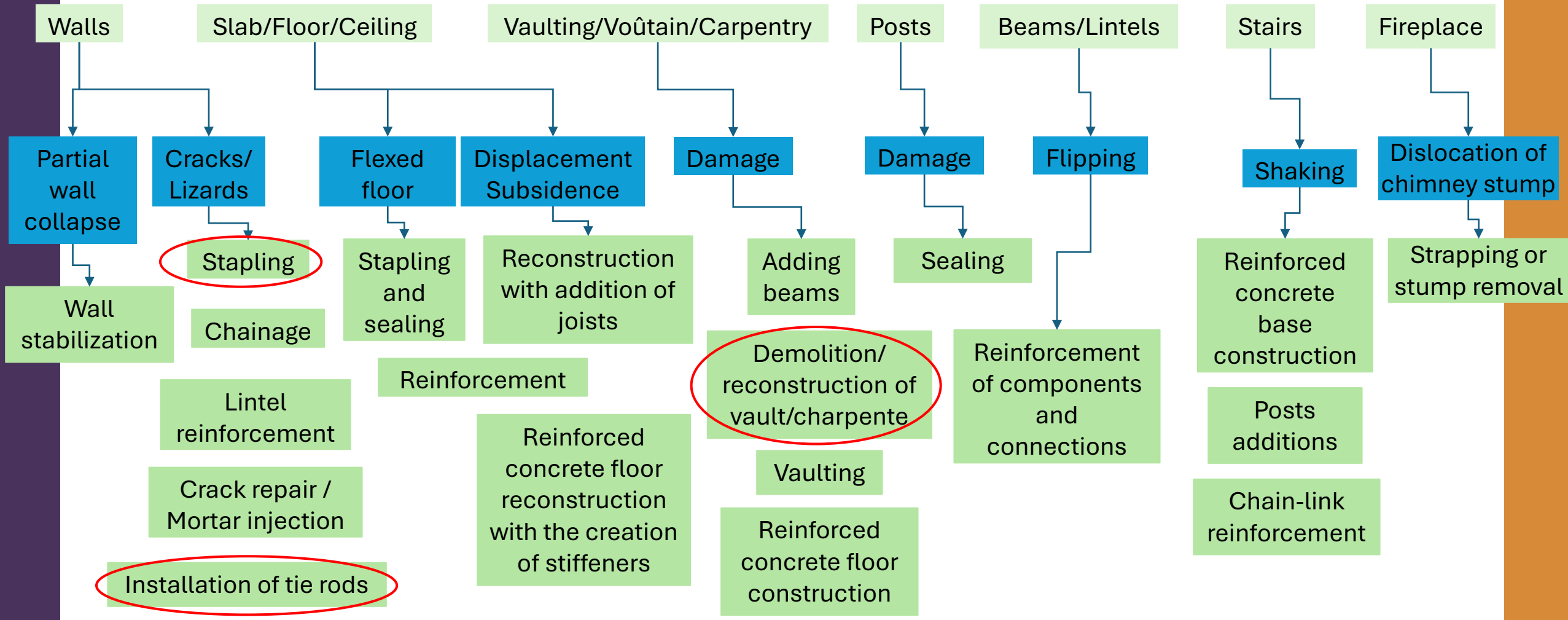
Objective : Study the types of structures, damage and reinforcement/renovation work carried out on the basis of surveyed decree files

Tasks carried out :

- **Process of data sheets for buildings with civil engineering information (56 buildings).**
- **Modeling of one of the buildings using 3Muri software:** initial state, comparison of observed damage vs. modeled damage, inclusion of reinforcement recommendations in the model.
- **Interpretation of model results:** attempt to quantify the impact of strength and ductility recommendations.

Please note: **This data set is very limited (56 files) : Most damaged buildings**

MASONRY - *Rubble, Stone*



Most frequently observed recommendations:
Staples in 58% of cases, ties in 67% of cases and demolition/reconstruction of an element in 52% of cases

Please note: **This data set is very limited (56 files) : Most damaged buildings**

MASONRY - *Parpaing, Concrete block, Mixed*

- Walls
  - Cracks/ Lizards
    - Harping
    - Chainage readjustment
    - Carbon fiber
    - Crack opening
      Purge
      Mortar without shrinkage
    - Installation of tie rods
- Slab/Floor
  - Cracking Bending
    - Stapling and sealing
    - Reinforcement
  - Subsidence
    - Work foundation, delete, screed
- Ceiling
  - Damages
    - Reinforcement, chainage, partial or total removal of the roof
- Reinforced concrete structure
  Posts beams
  - Damages
    - Shotcrete
    - Post lining
    - Strengthening elements and links
- Lintels
  - Cracking
    - Lintels replacement
- Stairs
  - Damages
    - Reinforced concrete base construction
    - Posts additions
    - Chain-link reinforcement

Types of masonry in the data set (56 buildings)

Stone masonry building, rubble: 64%
Masonry mastic building: 21%
Block Masonry Building: 15%

Status End 2023:

- reconstruction reached 90%, given that buildings diagnosed as green were assumed to have been systematically renovate
- around 70% of the peril orders have been lifted (subject to the database provided by the mayor's office being up to date)

Recommandations:

- Collecting pre-existing data is a prerequisite for monitoring post-seismic reconstruction.
- ***Monitoring the lifting or maintenance of initial evacuation orders in the reconstruction process***
- Implementation of evacuation orders aimed at ensuring the safety of people in the context of crisis management (decisions to be taken in terms of safety) => Recommendation to set up a new building inspection in a context other than "emergency/crisis management" (e.g. 6 months after the event) with the aim of distinguishing between dwellings requiring major structural renovation/reconstruction work and those requiring only safety work on non-structural or aesthetic elements.
- ***Consider implementing a more technical analysis of the work carried out whenever possible and beneficial*.**
- When inspecting sites, it would be interesting to classify buildings according to the damage levels of EMS-98 (in addition to the 3 colors of the emergency diagnosis) also to facilitate the processing and use of the database for research purposes.

BRGM, the French Geological Survey

Thank you for your attention!

<u>Contacts</u> :

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Mauro Dolce

Professor of Structural Engineering, President of ReLUIS

RISK DEFINITION AND REDUCTION

$$R = f(H, E, V, C)$$

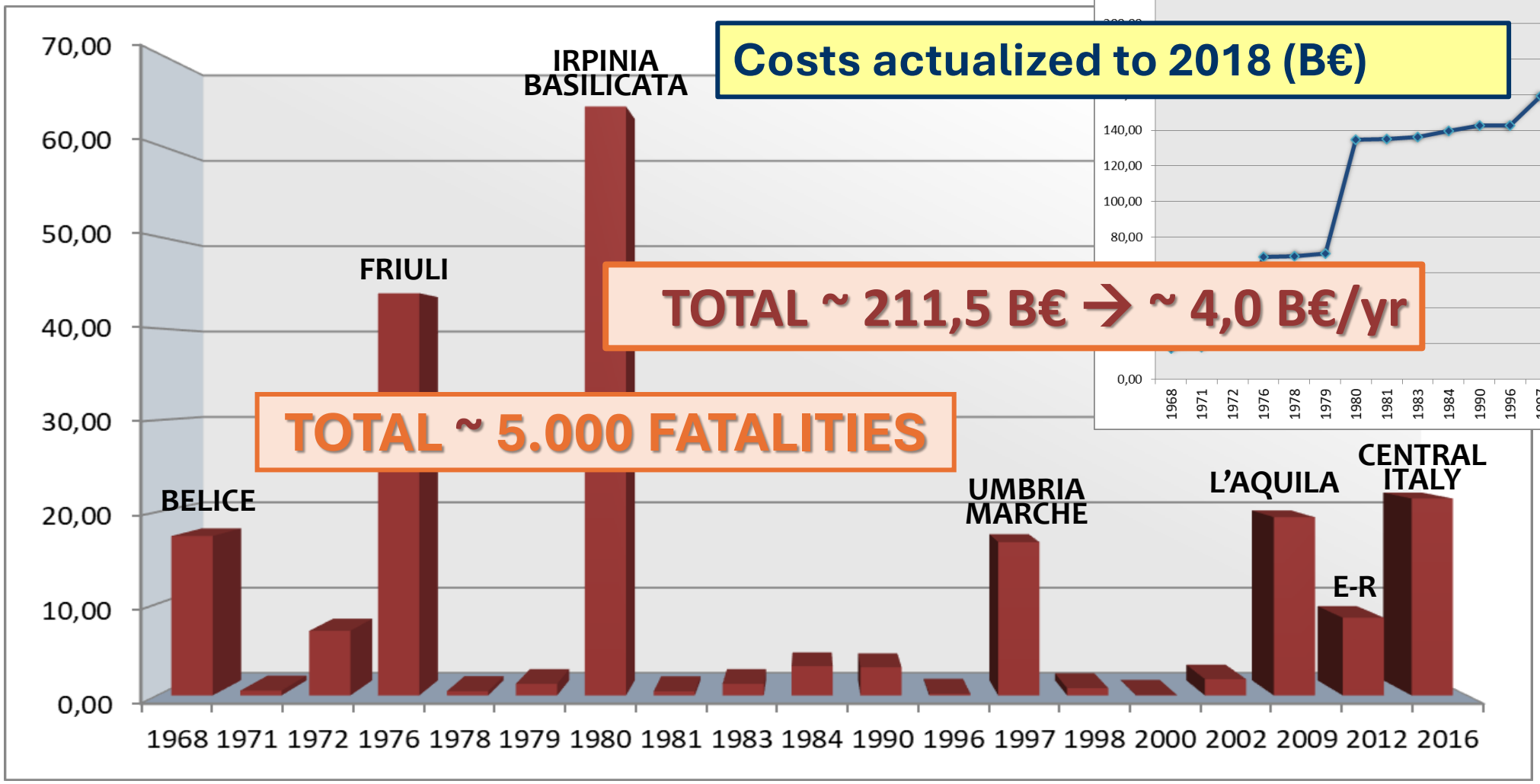
Potential **casualties, injuries or damaged or destroyed property** that could occur to a system, society or community in a specific **period of time**, **probabilistically** determined according to **hazard (H), exposure (E), vulnerability (V)** and **capacity (C)**.

United Nations - Report of the open-ended intergovernmental expert working group on indicators and terminology relating to disaster risk reduction, 2016

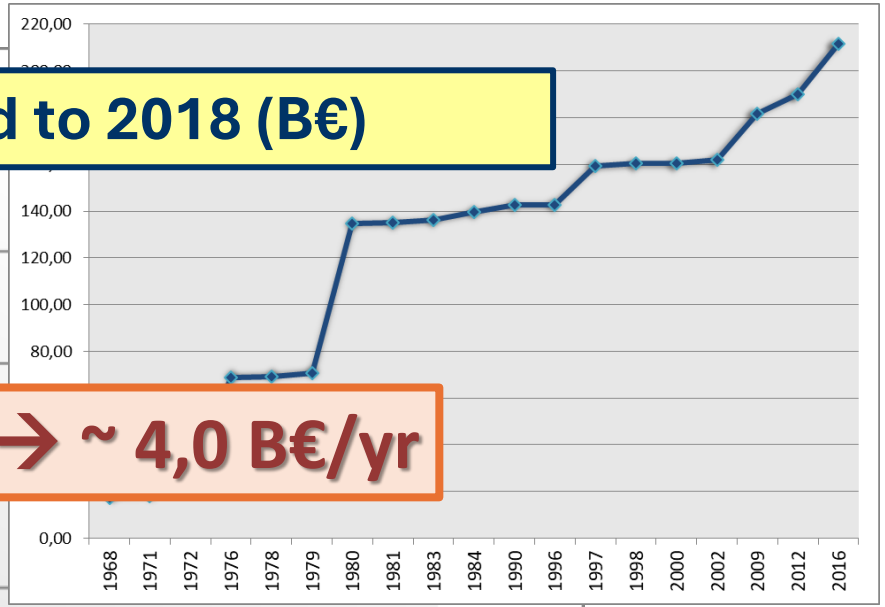
To **REDUCE RISK** one has to:

- **Reduce** Hazard (not for earthquake), Exposure or/and Vulnerability
- **Improve** Capacity (e.g. emergency management)

LOSSES FROM ITALIAN EARTHQUAKES SINCE 1968



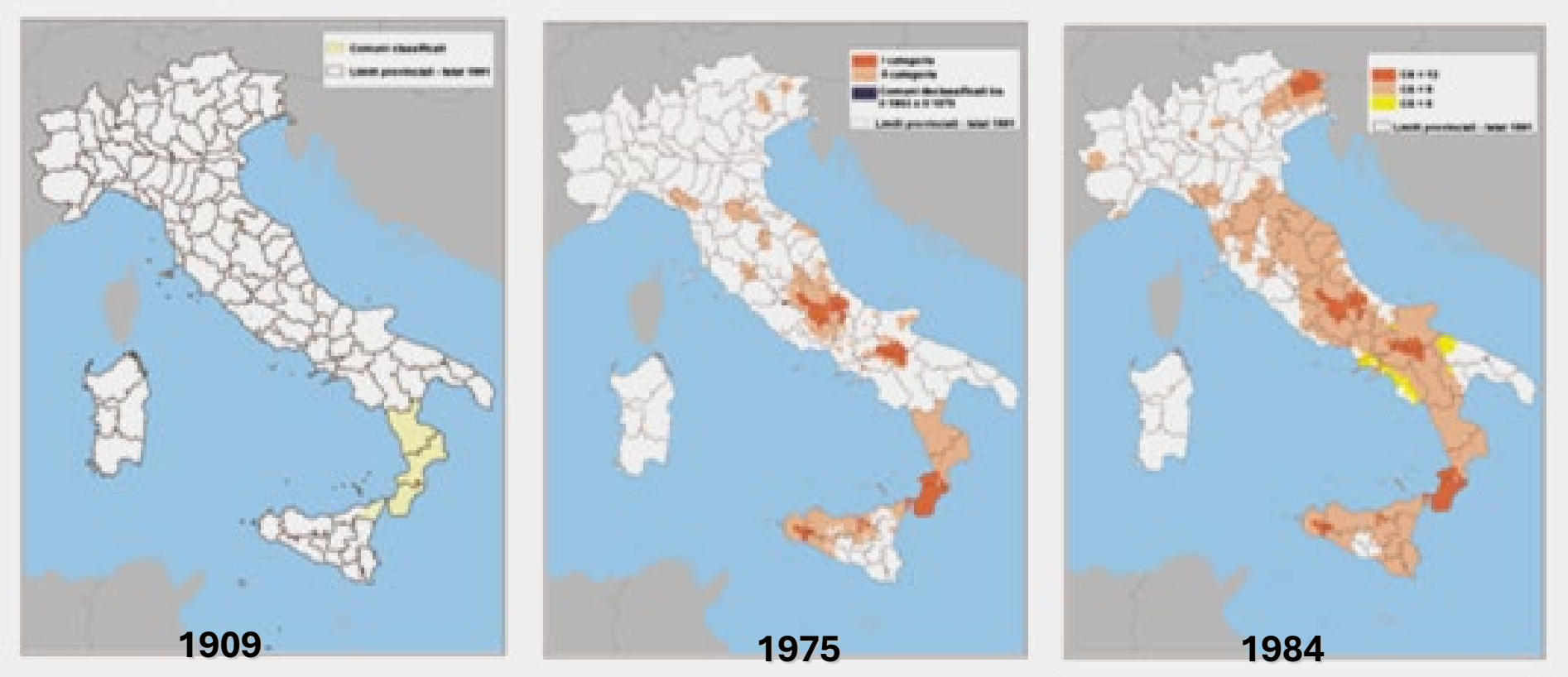
Costs actualized to 2018 (B€)



TOTAL ~ 211,5 B€ → ~ 4,0 B€/yr

TOTAL ~ 5.000 FATALITIES

SEISMIC CLASSIFICATION BEFORE 2003



Before 1980, municipalities that had suffered significant seismic events since 1905 had been classified as seismic zones.

STRUCTURAL AND NON-STRUCTURAL PREVENTION

DRR management encompasses the **entire risk cycle,** including **prevention and preparedness, forecasting, emergency management and overcoming**

Italian Civil Protection Code (D. Lgs n.1/2018)

Prevention*. The set of activities of a* ***structural and non-structural*** *nature, also carried out in an integrated form, aimed at* ***avoiding or reducing*** *the* ***possibility of damage resulting from calamitous events****, also on the basis of the knowledge acquired as a result of forecasting activities.*

STRUCTURAL AND NON-STRUCTURAL PREVENTION

KNOWLEDGE IMPROVEMENT (understanding risk)

- Technical-scientific knowledge
- Knowledge of the territory and the built environment

ACTIONS TO REDUCE VULNERABILITY AND EXPOSURE

Structural Prevention

- Indirect actions – improvement of tools
- Direct actions – reducing the vulnerability of the built environment

ACTIONS TO IMPROVE CAPACITY (mitigation of effects)

- Improvement of the organization of the civil protection system
- Dissemination of risk knowledge and culture of civil protection
- Exercises to check civil protection plans and train people
- Instrumental monitoring and surveillance
- ……

ACTIONS TO REDUCE VULNERABILITY AND EXPOSURE

INDIRECT ACTIONS [NON-STRUCTURAL PREVENTION]

→ **improvement of tools for**

- **Design**
  → Hazard, Classification, Code,
- **Planning**
  → Seismic Microzonation
  → Urban planning
  → Emergency planning

DIRECT ACTIONS [STRUCTURAL PREVENTION]

- **Seismic upgrading of public buildings and infrastructures**
  → hospitals,
  → schools,
  → transport infrastructures, etc.
- **Seismic upgrading of private buildings**

SEISMIC PREVENTION AFTER 2002

S. Giuliano di Puglia 31.10.2002
M=5.6, 30 fatalities in a school

OPCM 3274/2003 →

- **New seismic classification**
- **New seismic code**

NON-STRUCTURAL PREVENTION AFTER 2003

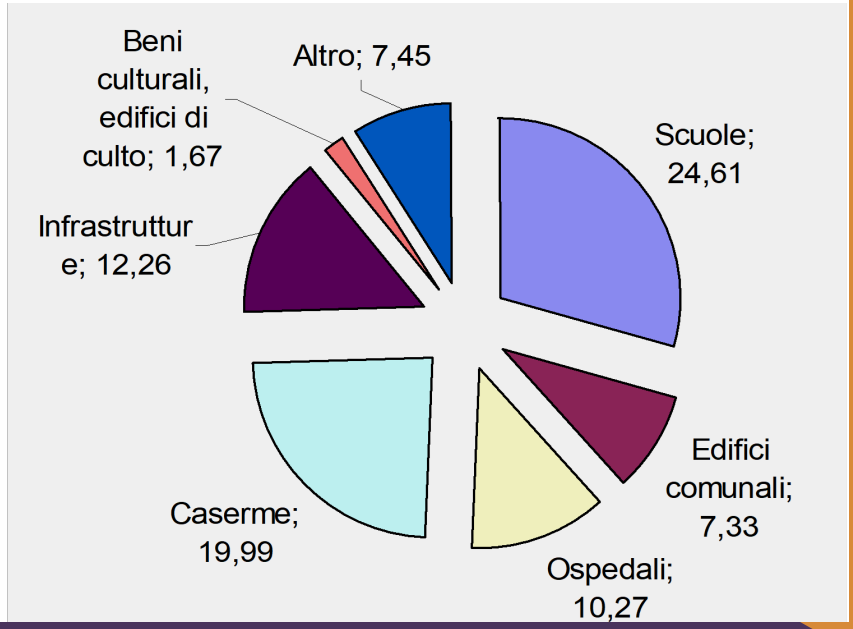
THE SEISMIC VERIFICATION PLAN

The PCM Ordinance 3274 of 20.03.2003 introduced a Verification Plan for buildings and infrastructures that are **strategic** for civil protection purpose or **relevant** for collapse consequences:

- Obligation of seismic verification by owners within 5 years (deadline extended)
- Priority for seismic zones 1 and 2 and buildings built before 1984

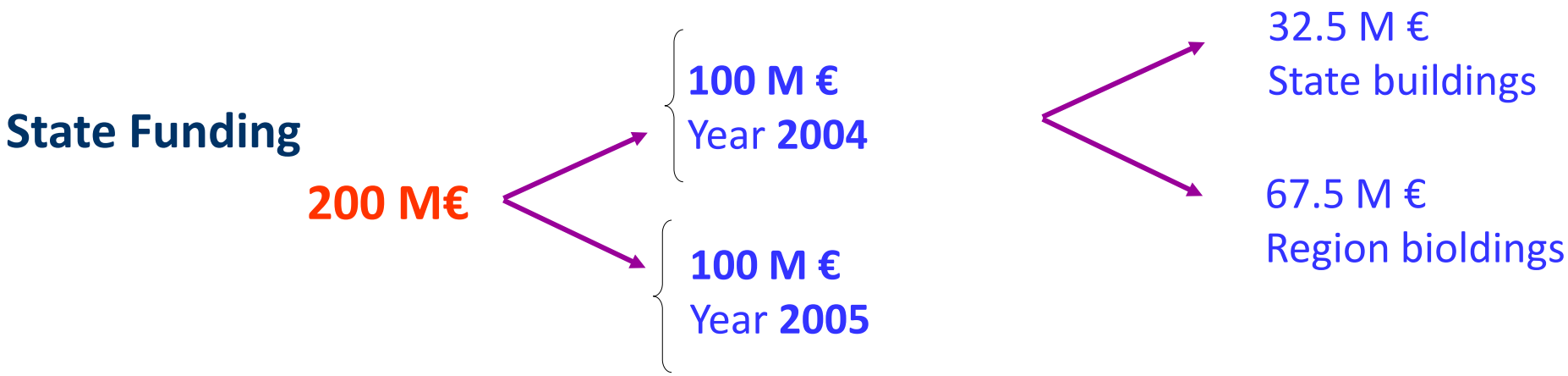
Seismic verifications were partly funded by Law no. 326/2003

- **7000** verifications (**83 M€,** cofunded by local administrations)
- **2400** verifications of school buildings (**24.6 M€**)



STRUCTURAL PREVENTION AFTER 2003

Law no. 326, art. 32bis



Interventions eligible for funding

A. Sesmic verifications;
B. **Seismic upgrading interventions following verifications;**
C. **Seismic upgrading interventions based on previous studies, even in the absence of verifications.**

About 230 interventions

STRUCTURAL PREVENTION AFTER 2003

Law no. 289/2002, art. 80 - Extraordinary plan for the safety of school buildings

- Programme funded with about **500 M€** (years 2004 and 2005)
- about **1600** interventions to improve schools with the highest seismic risk.

Law no. 244/2007 (2008 budget) – for school buildings

- **20 M€/year** available from 2008
- Demolition/reconstruction or upgrading
- Funded on average **40-50 interventions / year**

SEISMIC PREVENTION AFTER 2009

Legislative Decree No. 39/2009 "Abruzzo" (converted by Law No. 77/ 2009)

In addition to measures aimed at emergency overcoming and reconstruction, two important measures were also adopted for **Seismic prevention at national level**:

- **Full enforcement of the new Technical Standards (DM 14.01.08) from 1.07.09**
- Allocation of 965 M€ over 7 years for seismic prevention, entrusted to the DPC (*from 2018 €50 M€/year*)

NON STRUCTURAL PREVENTION AFTER 2009

8.4 CLASSIFICATION OF INTERVENTIONS

The following categories of intervention are identified:

– ***repair or local interventions:*** interventions that affect individual structural elements and that, in any case, do not reduce pre-existing safety conditions;

– ***upgrading interventions:*** interventions aimed at increasing pre-existing structural safety, without necessarily reaching the safety levels set out in § 8.4.3 (*i.e. for new constructions*);

– ***full retrofit interventions:*** interventions aimed at increasing the pre-existing structural safety, achieving the safety levels set out in § 8.4.3 (*i.e. for new constructions*).

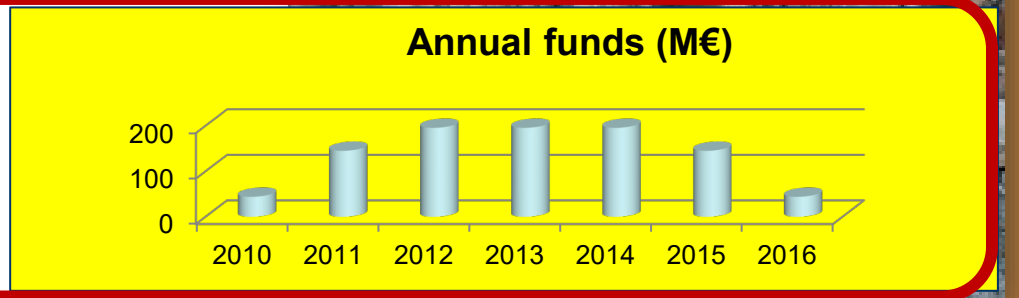
SEISMIC PREVENTION AFTER 2009

Legislative Decree No. 39/2009 "Abruzzo" (converted by Law No. 77/ 2009)

In addition to measures aimed at emergency overcoming and reconstruction, two important measures were also adopted for **Seismic prevention at national level**:

- Full enforcement of the new Technical Standards (DM 14.01.08) from 1.07.09
- **Allocation of 965 M€ over 7 years for seismic prevention, entrusted to the DPC** (*from 2018 €50 M€/year*)

L'AQUILA EARTHQUAKE
6 April 2009



GENERAL STRATEGY OF THE PLAN

- Pointing towards the **reduction of the risk of human losses**, → interventions on **highest hazard areas (ag[475yr] ≥ 0.125g**);
- **Wide spectrum of** actions:
  - **Non Structural Prevention**
    Improvement of tools: **seismic microzonation**, **urban and emergency planning**
  - **Structural Prevention**
    Reduction of the vulnerability: **retrofit of public buildings** and **urban infrastructures**
  - **Structural Prevention**
    Reduction of the vulnerability: **retrofit of private buildings**
- **Co-funding by local public administrations and by private owners**

DECISION CHAIN

Fund distribution **by DPC** according to **expert judgement**:

- **~90% funds for Structural Prevention → short term effect** (strengthening of buildings and bridges)
- **~10% funds for Non-structural prevention → long- and medium- term effect** (seismic microzonation, urban planning, contingency planning, design improvement)

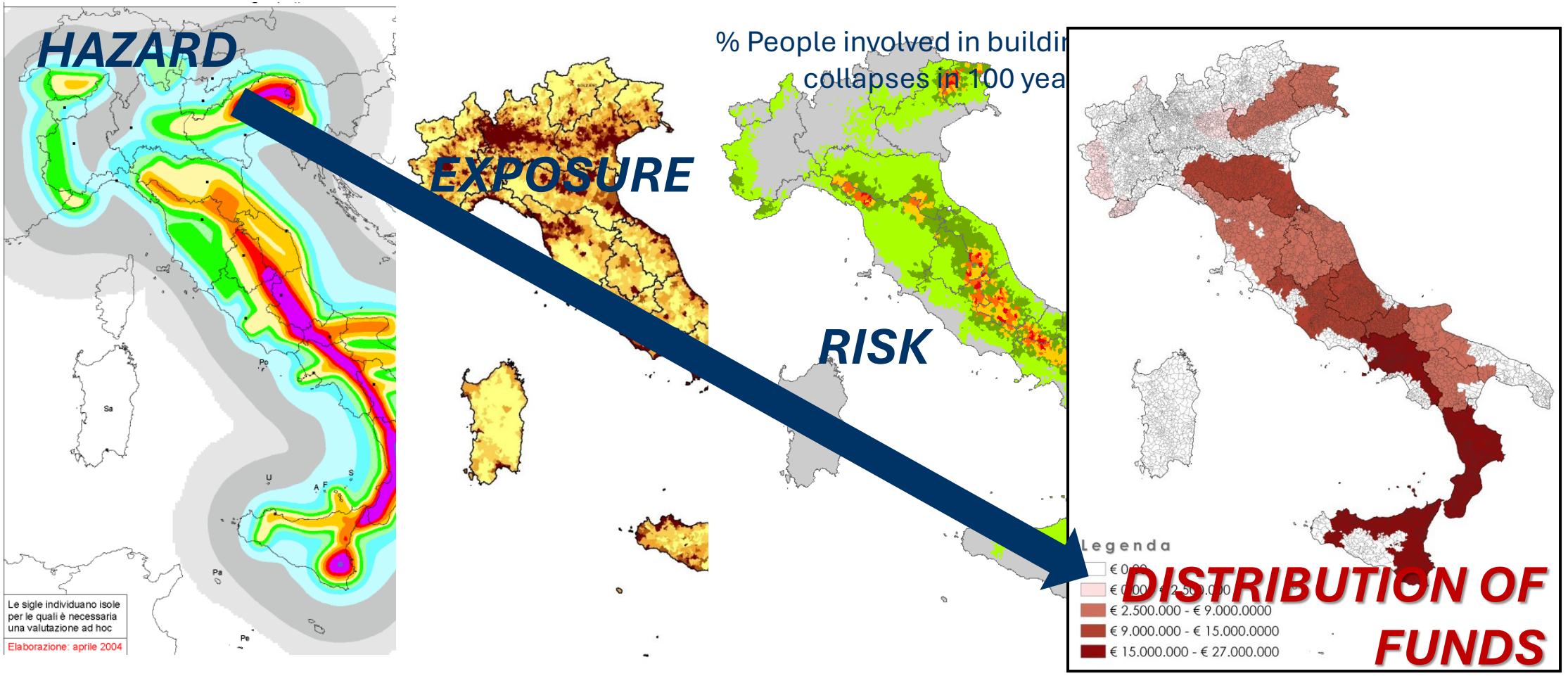
Distribution of funds among regions by DPC → according to **seismic risk** (global and individual) and **hazard** (ag>0.125g)

Selection of municipalities by Regions for non structural prevention (MS, LCE) → According to **seismic hazard**

Selection of buildings for structural prevention (made **by Regions**, according to the requests by **municipalities** and to the level of **seismic safety**)

DISTRIBUTION OF FUNDS AMONG THE REGIONS

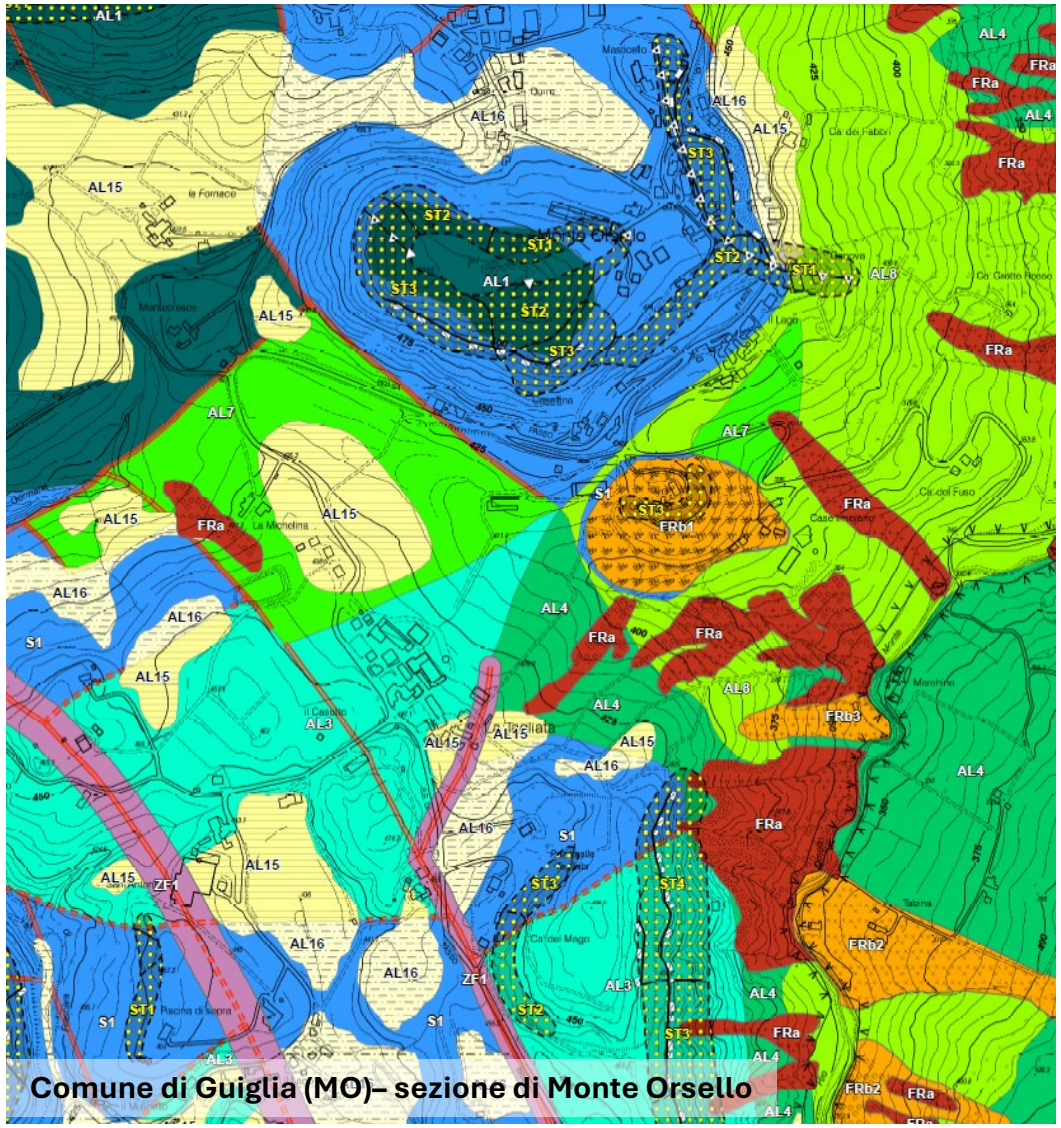
based on seismic **hazard and risk assessments**



NON STRUCTURAL PREVENTION AFTER 2009

- The National Prevention Program has been addressed to **non-structural prevention activities at municipality level**, through:
  - ✓ **Seismic Microzonation** studies **(SM)**
  - ✓ **Limit Condition for Emergency** analyses **(LCE)**
- This investment allows about **half of the Italian municipalities** to be endowed with **SM** studies and **LCE** analyses.
- **SM** outcomes, defining the **seismic hazard at local level**, are used for **territory management, emergency planning, post-earthquake reconstruction** and **structural design**

MICROZONATION MAP OF LEVEL 2



Comune di Guiglia (MO)– sezione di Monte Orsello

ZONE STABILI
[F.A. P.G.A. F.A. IS 0.1-0.5 F.A. IS 0.5-1]

S1

ZONE STABILI SUSCETTIBILI DI AMPLIFICAZIONI LOCALI
[F.A. P.G.A. / F.A. IS 0.1-0.5 / F.A. IS 0.5-1]

AL1	AL2	AL3	AL4	AL5	AL6	AL7	AL8	AL9
1.3-1.4 1.2-1.4 1.2-1.4	1.6 1.6 1.4	1.4-1.5 1.4 1.3-1.4	1.5 1.5-1.6 1.4	1.5-1.6 1.5-1.7 1.4-1.5	1.9-2 1.8-2 1.5	1.6-1.7 1.6-1.8 1.4-1.6	1.6-1.9 1.6-1.9 1.4-1.7	1.7-1.9 1.7-1.8 1.4-1.5

AL10	AL11	AL12	AL13	AL14	AL15	AL16
2 1.8-1.9 1-1.2	1.2 1.7-1.9 2	1.2 1.7-1.9 2	2 1.9 1.5	1.7-1.8 1.7-1.9 1.4-1.6	1.8-1.9 1.7-1.9 1.4-1.5	1.5-1.7 1.4-1.6 1.1-1.4

ZONE SUSCETTIBILI DI INSTABILITA'
Aree sulle quali effettuare approfondimenti di III livello

Instabilità di versante (FR)

a) attiva
b) quiescente

Corpo di frana per scorrimento
Corpo di frana per colata
Corpo di frana DPGV
Corpo di frana complessa

Frane quiescenti (FRb)
[F.A. P.G.A. / F.A. IS 0.1-0.5 / F.A. IS 0.5-1]

FRb1	FRb2	FRb3	FRb4	FRb5	FRb6	FRb7
[1.5-1.6 1.5-1.6 1.4]	[1.7-1.9 1.5-1.6 1.4]	[1.8 1.7-1.8 1.5-1.7]	[1.9 1.9 1.5-1.7]	[1.9-2 1.9-2 1.5]	[1.9-2 1.9-2 1.5-1.7]	[1.9-2 1.9-2 1.7-1.8]

Zone ad intensa fratturazione (ZF)
[F.A. P.G.A. / F.A. IS 0.1-0.5 / F.A. IS 0.5-1]

ZF1	ZF2	ZF3
[2 / 2.3 / 2.4]	[2.2 / 2.2 / 1.7]	[2.2 / 2.5 / 1.9]

Effetti di amplificazione per condizioni topografiche

ST1	ST2	ST3	ST4
ST = 1,1	ST = 1,15	ST = 1,2	ST = 1,25

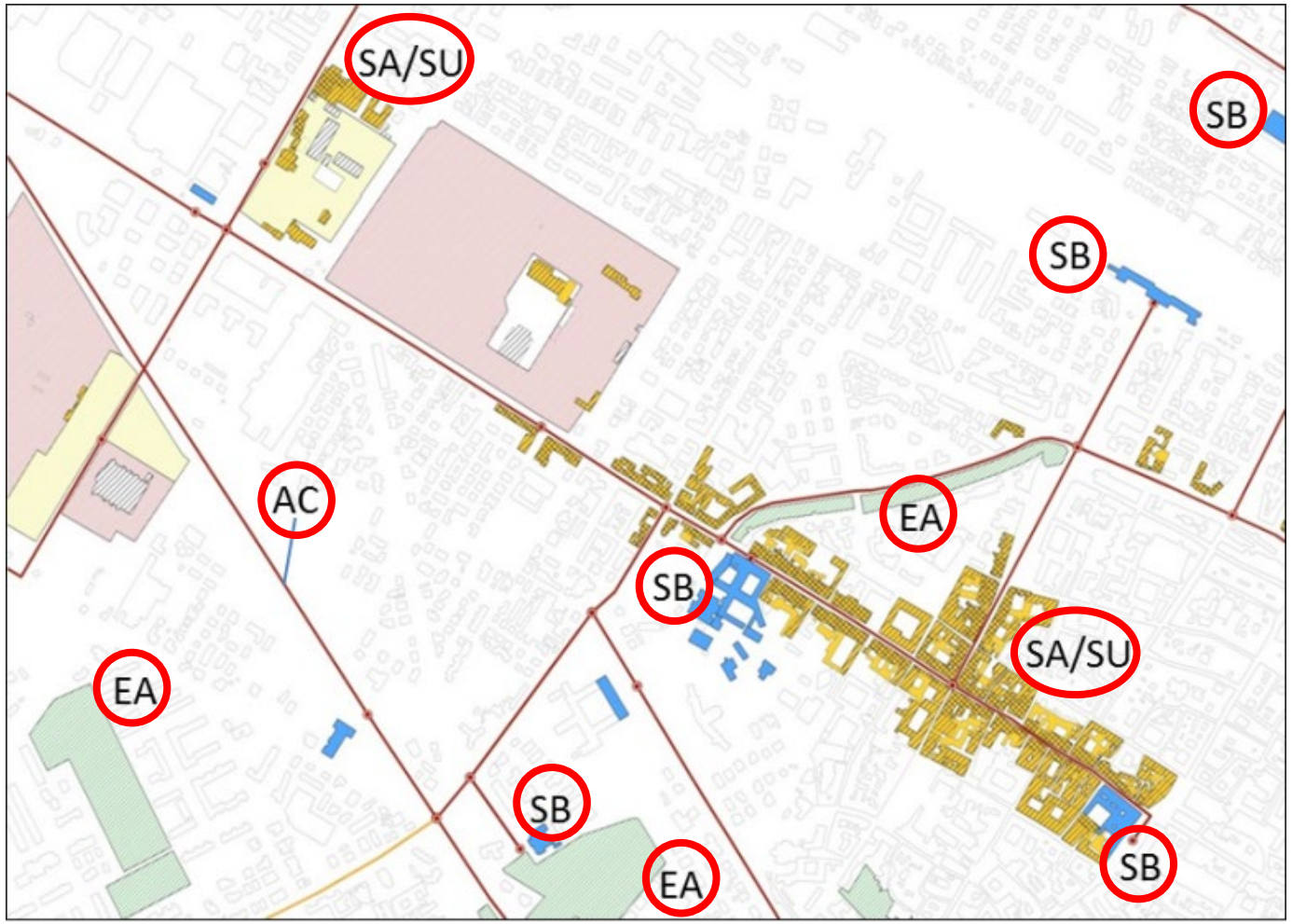
LIMIT CONDITION FOR THE EMERGENCY (LCE)

LCE is defined as the *condition for which, after a seismic event, the urban settlement undergoes such physical and functional damage as to interrupt almost all its urban functions, including dwelling, while the **functionality is preserved of***:

- **most of the strategic functions** for the emergency management,
- the **interconnection routes** between strategic elements
- the **access routes** from the external territorial context.

If the LCE is attained, the (minimal) **infrastructural system for emergency management (comprised of Strategic Buildings, Emergency Areas, Infrastructures of Accessibility and Connection)** must keep **structurally operational**.

LIMIT CONDITION FOR THE EMERGENCY (LCE)



SB Strategic Buildings

EA Emergency Areas

AC Accessibility Connection infrastructures

SA Structural Aggregates

SU Structural Units

The **I.OPà.CLE** procedure provides the **probability that the entire infrastructural emergency system remains structurally operational after an event**

STRUCTURAL PREVENTION AFTER 2009

Seismic Upgrading of Public Buildings and Bridges

The State contribution is evaluated as a quota of a conventional total cost for intervention given by:

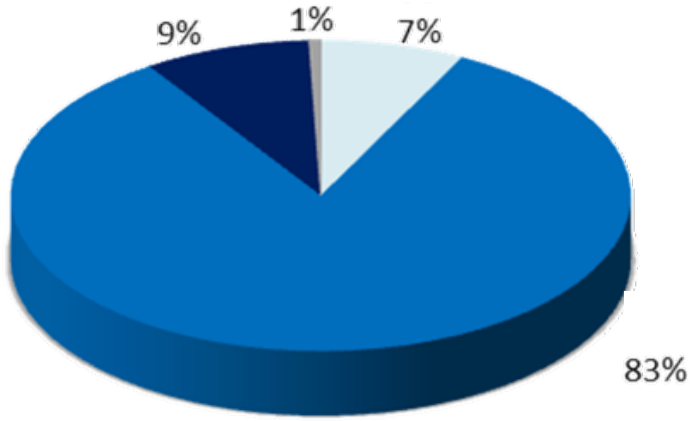
- **Local strengthening:**
  100 €/cm of the total volume of the **building**,
  300 €/sqm of the **bridge** deck;
- **Seismic upgrading:**
  150 €/cm of the total volume of the **building**,
  450 €/sqm of the **bridge** deck;
- **Demolition and reconstruction:**
  200 €/cm of the total volume of the **building**,
  600 €/sqm of the **bridge** deck.

Parametric costs have been subsequently updated

STRUCTURAL PREVENTION AFTER 2009

STRUCTURAL INTERVENTIONS ON PUBLIC BUILDINGS AND BRIDGES

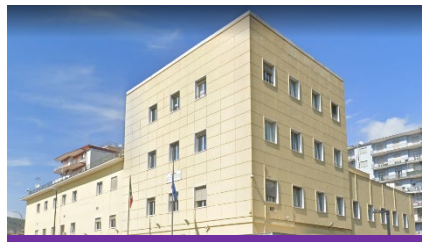
Statistical Analysis relevant to interventions on about 1000 buildings



83% Seismic Upgrading

51%

Town hall



Security

6%

School

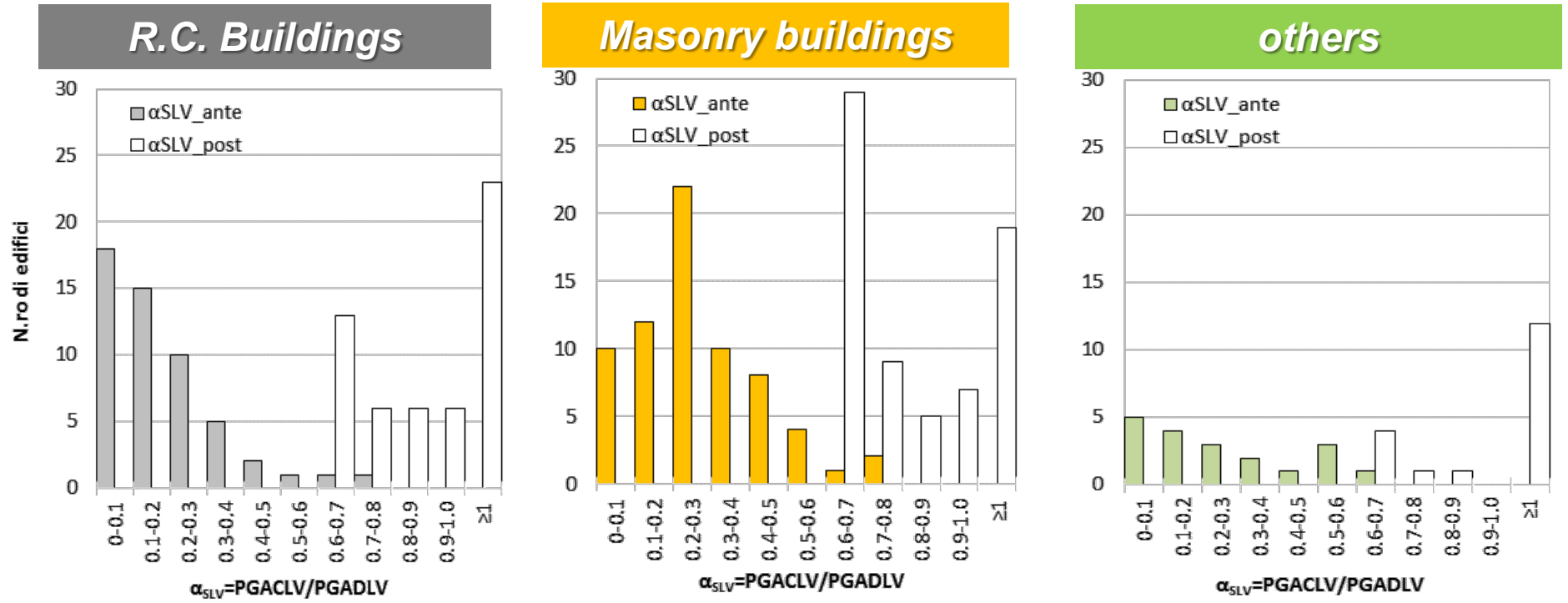
25%

Hospital

5%

INTERVENTIONS ON PUBLIC BUILDINGS AND BRIDGES

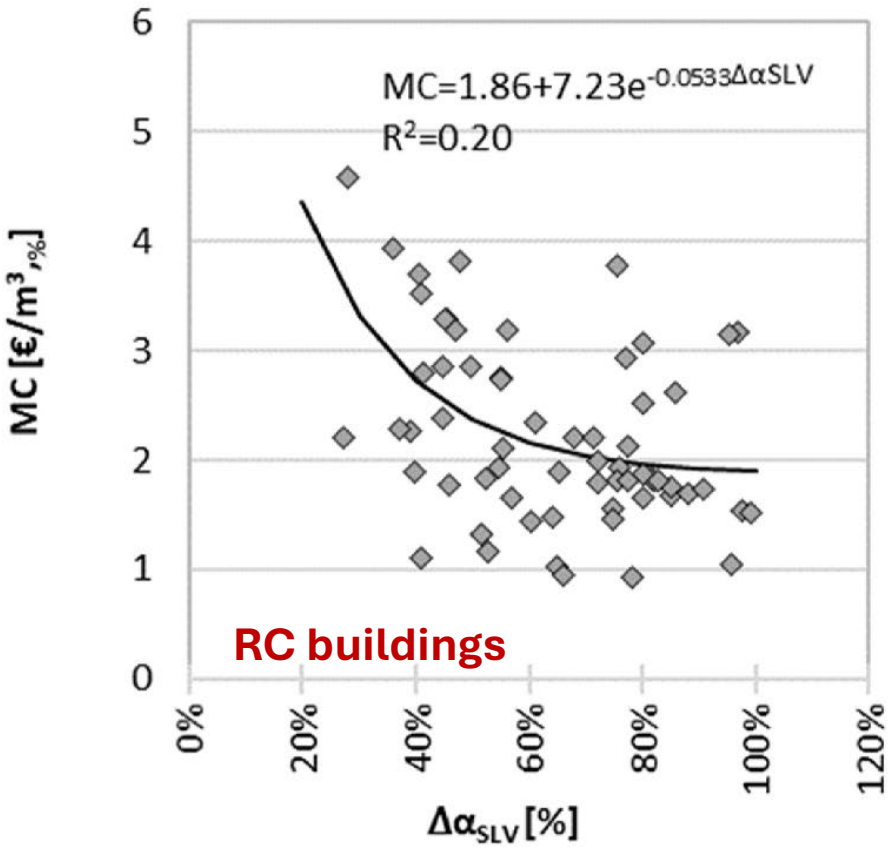
COMPLETED INTERVENTION AND INCREASE OF SAFETY

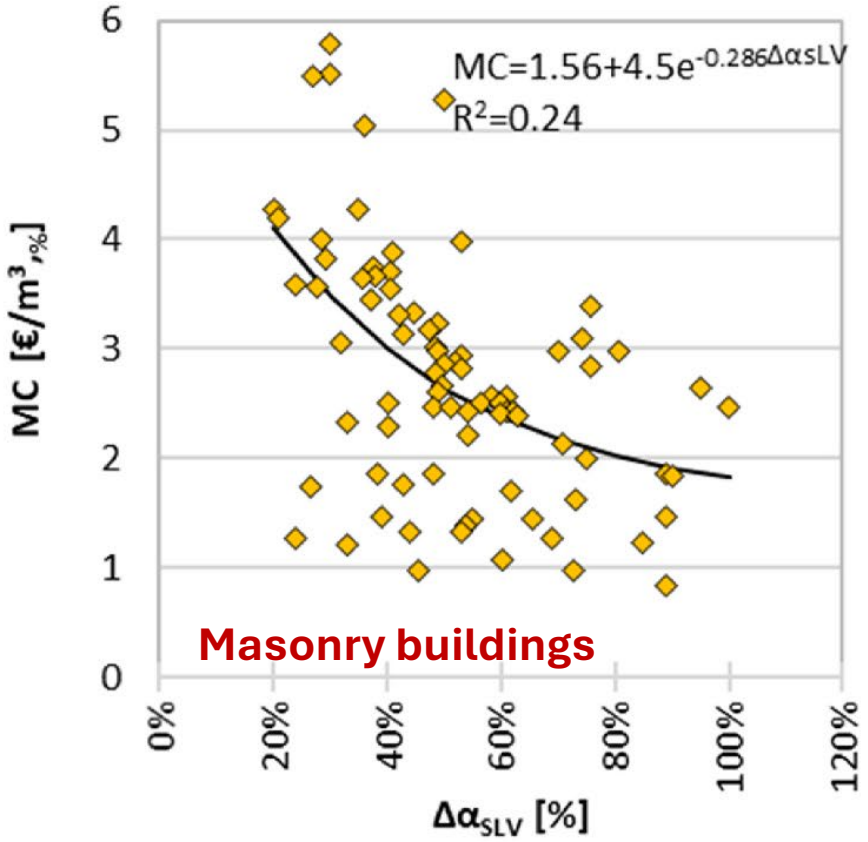


Analysis on a sample of buildings with SEISMIC UPGRADING completed

- For 33% of the sample the final safety level α_{slv_post} has attained **0.6-0.7.**
- **The remaining 67% greater than 0.7**

ACTUAL COST OF INTERVENTION ON PUBLIC BUILDINGS





- MC is the (marginal) cost of the seismic upgrading per building volume unit and percent point increase of the seismic safety index of the single building.
- $\Delta\alpha_{SLV}$ is the increment of the seismic safety index in percentage points

STRUCTURAL PREVENTION AFTER 2009

Seismic Upgrading of Private Buildings

The State contribution is evaluated as a quota of a conventional total cost for intervention given by:

- **Local strengthening:**
  100 €/sqm total surface area of the building (max € 20,000 per dwelling unit, € 10,000 per other unit);
- **Seismic upgrading:**
  150 €/sqm total surface area of the building (max € 30,000 per dwelling unit, € 15,000 per other unit);
  Demolition and reconstruction:
  200 €/sqm total surface area of the building (max € 40,000 per dwelling unit, € 20,000 per other unit).,

Parametric costs have been subsequently updated

STRUCTURAL PREVENTION AFTER 2009

Seismic Upgrading of Private Buildings

ALLOWED GRANTS → **3.818 blds**

SINCE 2017 FISCAL INCENTIVES (70-85% UP TO 110% TAX DETRACTION) FOR PRIVATE OWNERS HAVE BEEN INTRODUCED. FUNDS OF THE NATIONAL PLAN WERE NO MORE PROVIDED TO PRIVATE OWNERS

GENERAL CONSIDERATION ON THE PREVENTION PLAN

- It is well recognised that the main action to mitigate seismic risk should be the generalized **reduction of the seismic vulnerability of existing constructions**, besides guaranteeing adequate seismic safety to new constructions.
- This objective is the lengthiest and by far the most expensive to be attained: **huge investments and very long term risk mitigation policies are required**.
- The progressive implementation of vulnerability reduction measures must be accompanied by **other less expensive short time "soft" measures**, aimed at:
  - ✓ **rationalizing, optimizing and accelerating interventions**,
  - ✓ **reducing exposure** and the consequences of earthquakes.

MAIN REFERENCES

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Franco-Italian round table
September 17, 2024
« Build Back Better around seismic risk »
Julien Rey, DGPR

Association Française pour la Prévention des Catastrophes Naturelles et Technologiques

AFPCNT

Mieux comprendre, mieux prévenir

Soutenu par

MINISTÈRE DE LA TRANSITION ÉCOLOGIQUE ET DE LA COHÉSION DES TERRITOIRES

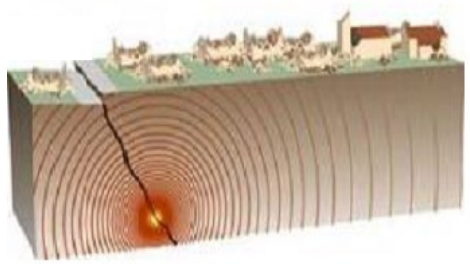
Liberté
Égalité
Fraternité

Pillars of prevention policy

- KNOWING THE RISKS INVOLVED
- KNOWING HOW TO PLAN YOUR TERRITORY
- THE RIGHT WAY TO BUILD INFRASTRUCTURE, NETWORKS AND BUILDINGS
- PREPARING FOR THE DAY OF THE EARTHQUAKE

Regulatory principles

Risk = Hazar ⊗ Vulnerability of issues



Reducing risk	Characterizing the hazard	Prioritizing issues	Reducing vulnerability
Regulatory organization	Decree no. 2010-1255	Decree no. 2010-1254	Building by-law October 22, 2010

Building rules according to hazard and stake

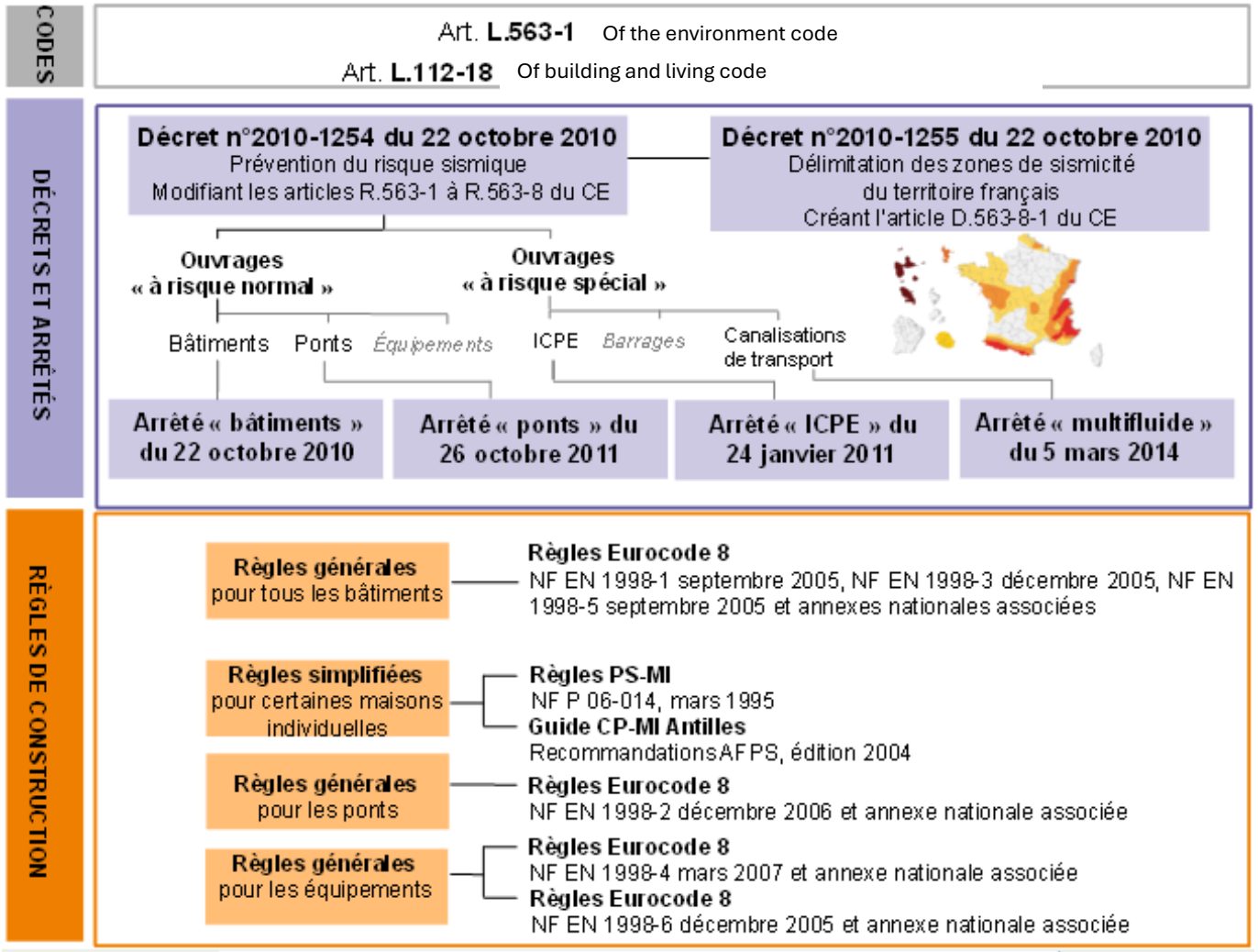
Specific orders

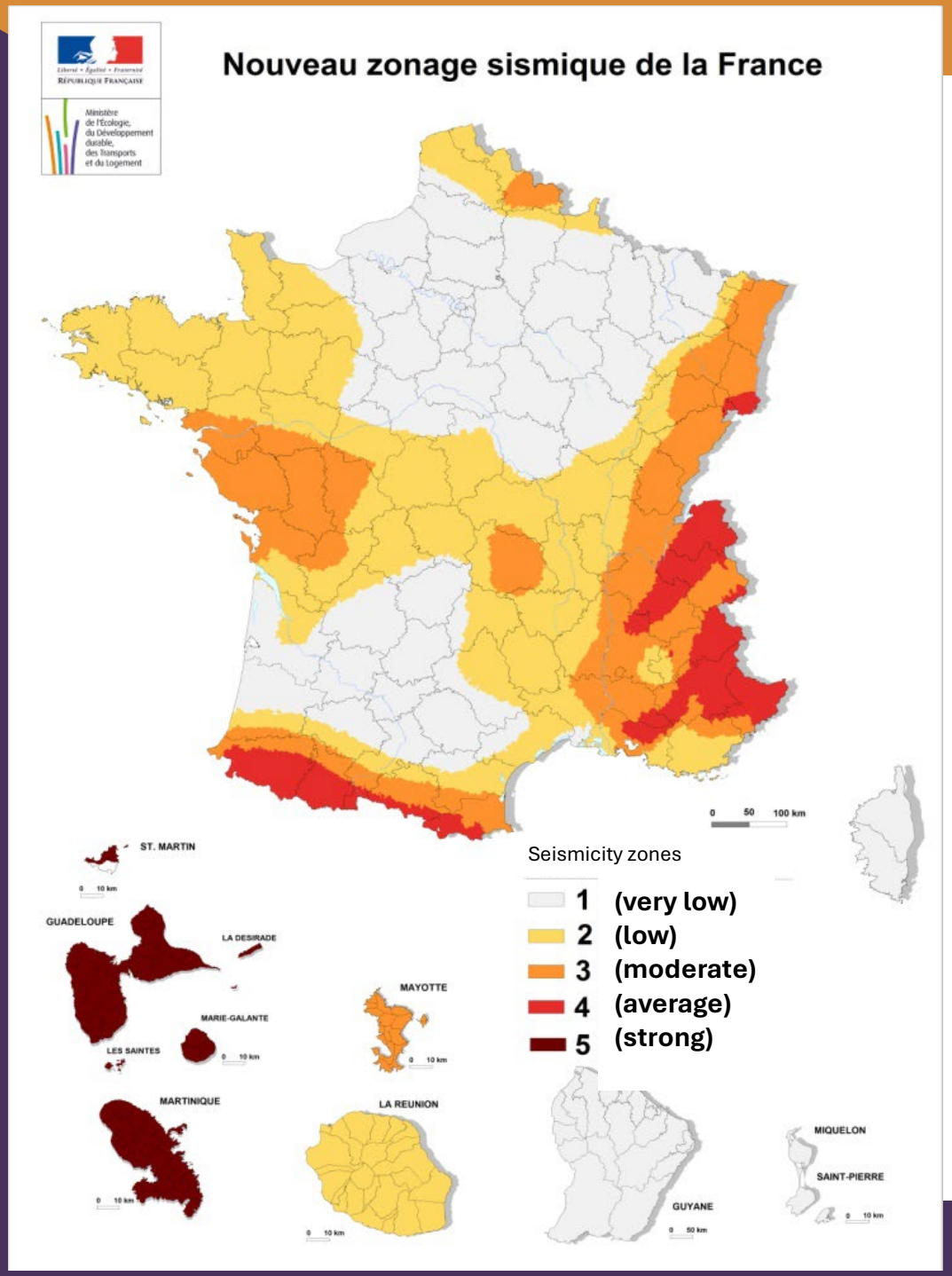
ICPE, dams, bridges and equipment

To adopt construction rules based on the hazard and the issue at stake

Regulatory organization

- The "buildings" order of October 22, 2010, as amended (by the orders of July 19, 2011, October 25, 2012 and September 15, 2014), was issued in application of article R.563-5 of the Environment Code:





Regulatory zoning since 2011

Note: zoning could be adjusted as part of the Eurocodes 8 update (2027).

Building regulations

Order of October 22, 2010: Classification of buildings

Relevance categories		Description	Exemples
I		buildings in which there is no human activity requiring a long-term stay	Sheds and farm buildings
II		• Individual homes • Public-access building categories 4 and 5 • Multi-family dwellings less than 28 m high • Offices or commercial buildings welcoming less than 300, public access building apart • Industrial buildings accommodating over 300 people • Parkings lots open to public	Individual buildings and small buildings
III		• Public-access building categories 1,2 and 3 • Multi-family dwellings and offices more than 28 m high • Buildings welcoming more than 300, public access building apart • Social and health facilities • Energy production centers • School facilities	Big buildings, malls, schools
IV		• Buildings essential to civil security, national defense and the maintenance of public order • Buildings used to maintain communications, produce and store drinking water, and distribute energy to the public. • Buildings used for air safety control • Health facilities required for crisis management • Meteorological centers	Primary protection : schools, barracks

Building regulations

Order of October 22, 2010: Rules for new buildings

	I 	II Small buildings 		III establishment 	IV Primary protection 
Zone 1	No requirements				
Zone 2	No requirements				**Eurocode 8**
Zone 3	No requirements	Simplified rules PS-MI		**Eurocode 8**	**Eurocode 8**
Zone 4	No requirements	Simplified rules PS-MI		**Eurocode 8**	**Eurocode 8**
Zone 5 (Antilles)	No requirements	Simplified rules CP-MI Antilles		**Eurocode 8**	**Eurocode 8**

Order of October 22, 2010 modified - Rules for existing buildings

- In general, regulations do not impose **seismic reinforcement work.**

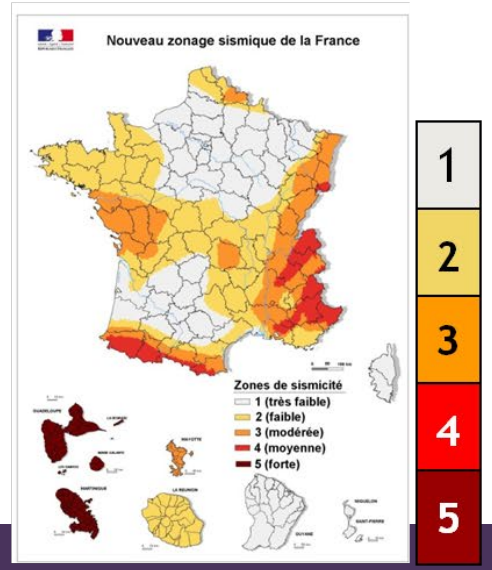
- In the event of work :

- Basic principle: **do not increase the vulnerability of** existing buildings.
- Gradation of requirements :

Relevance categories of buildings

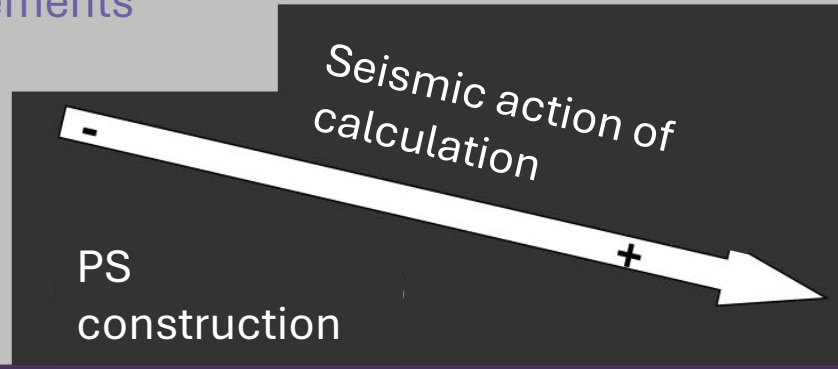
I	II	III	IV

Seismicity zones



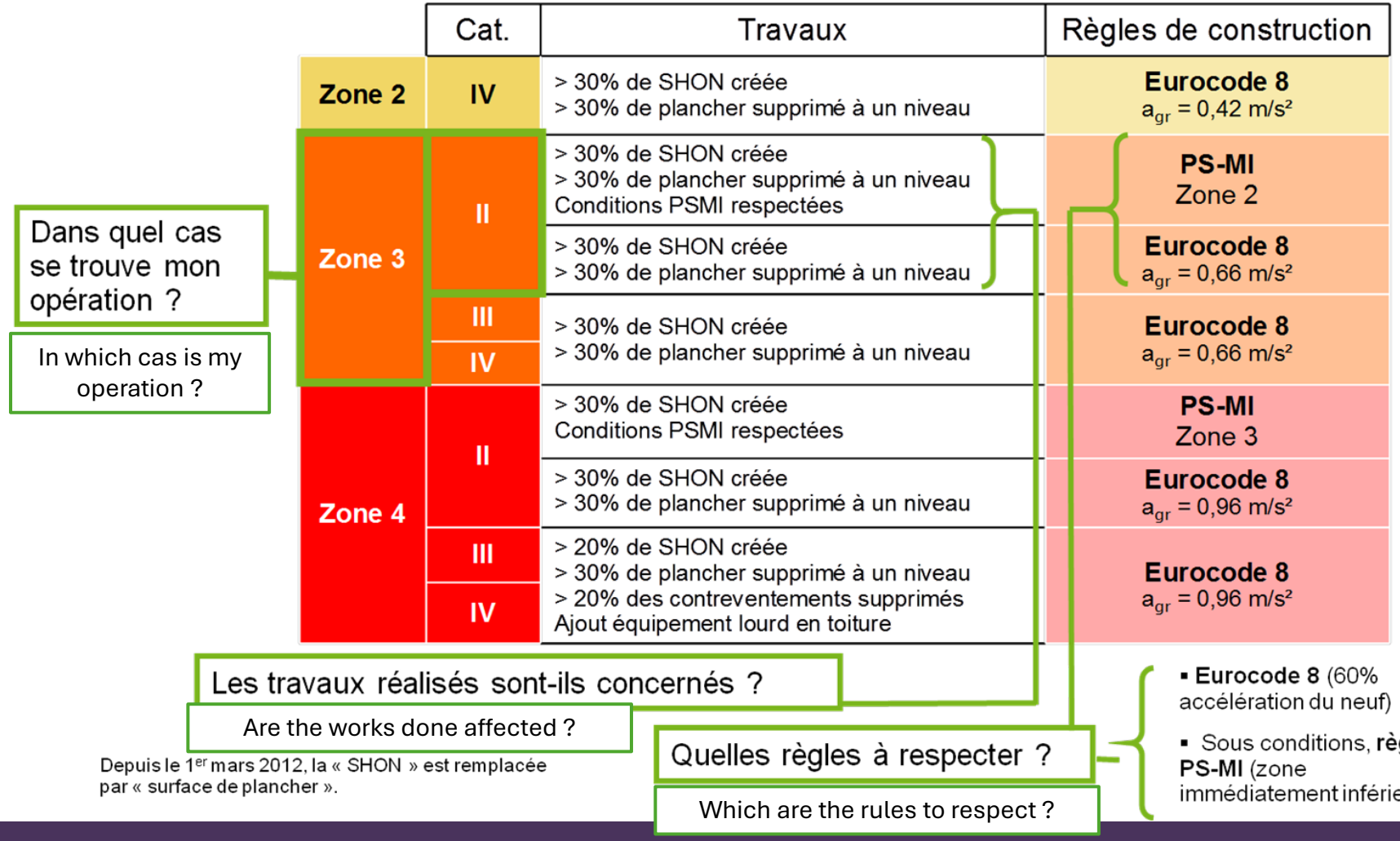
1
2
3
4
5

No requirements



Order of October 22, 2010 modified - Rules for existing buildings

- MANDATORY sizing: for major works



Order of October 22, 2010 modified - Rules for existing buildings

Rules on non-structural elements (ENS)

- ENSs represent a major challenge, particularly in the event of a moderate earthquake. Certain elements (false ceilings, partitions, chimney stacks, high facade elements, etc.) can be dangerous if they fall, and can also hinder evacuation and the movement of emergency services.
- Example: Annecy earthquake of July 15, 1996
- Which elements?
- → Domain defined by the guide "Dimensionnement parasismique des éléments non structuraux du cadre bâti - Justifications parasismiques pour le bâtiment à risque normal" (MLET-MEDDE, 2014).
- Which measures? Ex. Lourdes PPR (2023), RVPSA measure (2024)
- When **adding** or **replacing ENS** during **major works**, the provisions of Eurocode 8 must be applied.
- Possibility of using the simplified seismic justification methodology proposed in the guide.

Order of October 22, 2010 modified - Rules for existing buildings

VOLUNTARY reinforcement - Eurocode 8-3

- The design level (limit state, acceleration) is chosen by the client.
- Principle :
- The greater the knowledge of the structure,
- The more appropriate and optimized the reinforcement sizing,
- The lower the cost of reinforcement.

Guides and technical documents for reinforcement

- Diagnosis and reinforcement of existing buildings" guide (DHUP - AFPS-CSTB, 2013)
- CT AFPS n°35 "Evaluation of the impact of work on the seismic vulnerability of an existing building - Analysis grid" (2014)
- AQC brochure "Reinforcing existing buildings in seismic zones" (2011)

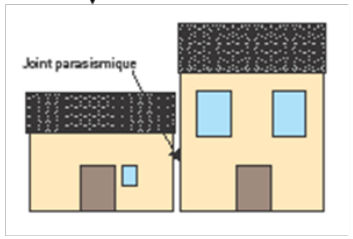
Building regulations

Order of October 22, 2010

•Rules for existing buildings - Grading of requirements

Measure RVPSA
Order 26/03/2024 lists the types of work to reduce vulnerability to earthquakes in zone 5 eligible for the FPRNM.

WORKS

Basic principles	I would like to improve the behavior of my building	I make major works on my building	I create an extension with gasket splitting
Basic principles: non-aggravation of the existing building vulnerability	Eurocode 8-3 : Objectif of reinforcment to choose by the builder of work	Modulation of building regulations applicable to new buildings ↓ Special conditions specified in the decree for major works	If splitting joint. new rules for the new part created. ↓ 

ICPE regulations : **Order of January 24, 2011** establishing the earthquake-resistant rules applicable to certain classified **facilities**

- ***Scope of application***
  - Seveso plants (high and low) - existing and new
  - Equipment likely to generate lethal effects in areas with permanent human occupation
- ***Provisions***
  - New installations: resistance to earthquakes with a 5,000-year return period
  - Existing facilities: resistance to earthquakes with a return period of 3,000 years

The text specifies the reference seismic movements.

- ***Deadlines for existing installations :***
  - Study of work to be carried out before December 31, 2015
  - Completion of work prescribed by order issued before December 31, 2016: the deadline for completion must not exceed January 1, 2021.
- ***Development of guides with AFPS and manufacturers***

Regulatory control

3 forms of control are possible:

- Technical inspection, mandatory for certain buildings
- Certificates of compliance with building regulations, at the time of building permit and completion of work
- Checking compliance with building regulations, CRC carried out by government officials

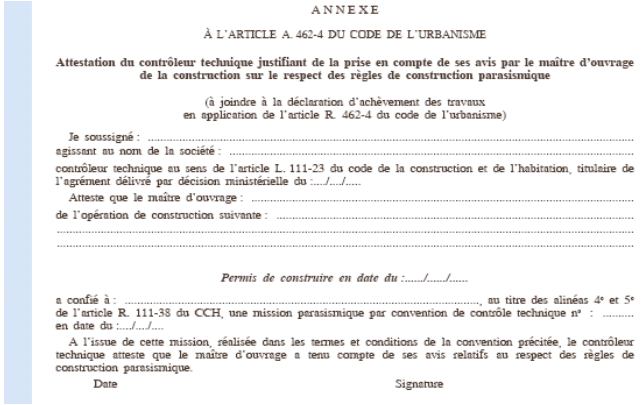
Regulatory control

- Technical inspection with mandatory PS mission for (art R111-38 du CCH) :
  - buildings over 8 meters in seismic zones 4 and 5,
  - Category III and IV buildings in seismic zones 2, 3, 4 and 5

Regulatory control

Two compulsory certificates for buildings subject to the PS mission when :

- Building permit application: a document issued by the technical inspector "certifying that he has informed the project owner of his opinion on the application of earthquake-resistant regulations".
- Declaration of completion: a document "certifying that the project owner has taken account of the technical inspector's advice on compliance with earthquake-resistant building regulations".



ANNEXE

À L'ARTICLE A. 462-4 DU CODE DE L'URBANISME

Attestation du contrôleur technique justifiant de la prise en compte de ses avis par le maître d'ouvrage de la construction sur le respect des règles de construction parasismique

(à joindre à la déclaration d'achèvement des travaux
en application de l'article R. 462-4 du code de l'urbanisme)

Je soussigné : .....

agissant au nom de la société : .....

contrôleur technique au sens de l'article L. 111-23 du code de la construction et de l'habitation, titulaire de l'agrément délivré par décision ministérielle du :.../.../.....

Atteste que le maître d'ouvrage : .....

de l'opération de construction suivante : .....

.....

.....

Permis de construire en date du :...../...../.....

a confié à : ....., au titre des alinéas 4° et 5° de l'article R. 111-38 du CCH, une mission parasismique par convention de contrôle technique n° : ..... en date du :.../.../....

A l'issue de cette mission, réalisée dans les termes et conditions de la convention précitée, le contrôleur technique atteste que le maître d'ouvrage a tenu compte de ses avis relatifs au respect des règles de construction parasismique.

Date Signature

More stringent requirements since January 1er 2024 (decree of 22/12/2023)

Control of compliance with building regulations (CRC)

- Principle

Highway code,
Driver's license,
...

Police services,
Controls, Prevention

Building code,
Building permits,
...

CRC earthquake-resistant

- For which operations?
  - CRC extended to seismic category in 2006
  - First operations inspected in 2011
  - Individual houses only

How are they made?

- By sworn officials (Ministry agents)
- Right of access to and communication of documents up to 3 years after DAT
- Choice of operations according to regional strategy: random selection and targeted choices

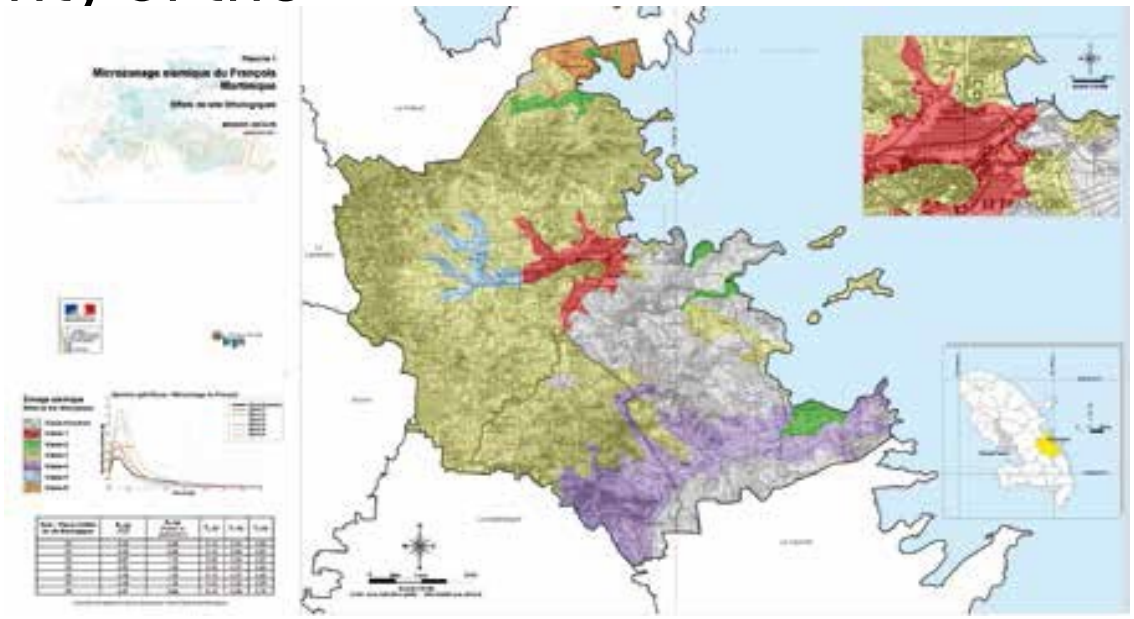
What happens next?

- Infringements: statutory penalties
- Educational component

Compliance with PS-MI rules

Natural hazard prevention plans (PPRN)

- At local level, a PPRN, when it takes seismic risk into account, can define **building rules that are better adapted** than national regulations to the nature and severity of the local risk.
- Prescribed by the prefect, a seismic PPR (PPRS) can impose construction measures:
  - on new buildings,
  - but also on existing buildings, up to a cost limit of 10% of the property's market or estimated value.



PPRN and PPR seismic

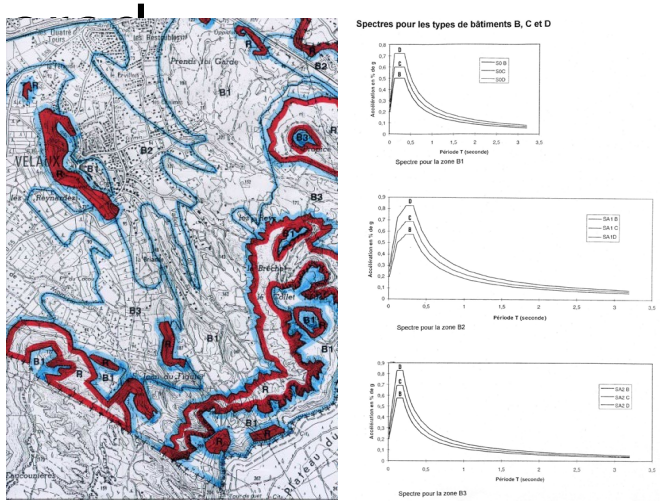
- The PPRN, created by the "Barnier" law of February 2, 1995, is governed by articles L.562-1 to L.562-9 and R.562-1 to R.562-12 of the Environment Code.
- The purpose of the PPRN is to **draw up urban planning, construction and management rules adapted to the nature and intensity of the risks**.
- It can also define:
  - prevention, protection and safeguard measures to be taken by local authorities and private individuals,
  - preventive measures for existing assets.
- The 2 main objectives of the PPRN :
  - ➢ Avoid worsening exposure to natural hazards,
  - ➢ Reduce the vulnerability of people and property.

Risk Prevention Plan (PPR)

The PPR (prescribed by the prefect) specifies :

- The study perimeter
- The nature of the natural hazards consid

Seismic PPR



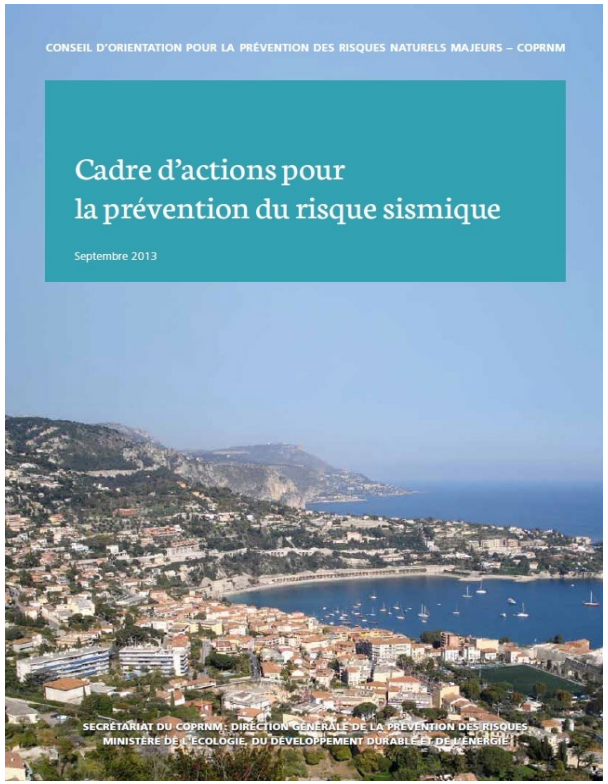
The PPR :

- is based on **"seismic microzoning"**:
  - carried out at **local level**,
  - adapted to the **local seismic context**.
- can impose :
  - **construction rules that are more appropriate** than national regulations,
  - **levels of protection that differ** from national regulations,
  - technical descriptions for adapting or **reinforcing existing buildings.**

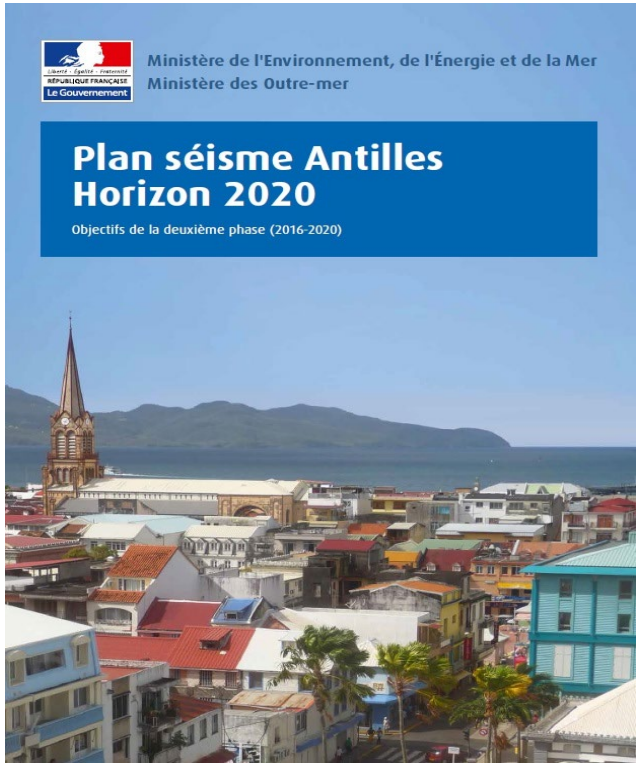
The provisions of the PPR replace national regulations

Prevention policy documents and instructions to prefects

- ***For France mainland, Reunion and Mayotte***
  - Framework of Actions for Seismic Risk Prevention (CAPRiS)



- ***For the French West Indies***
  - French West Indies Earthquake Plan (PSA)



Framework of Actions for Seismic Risk Prevention (CAPRiS)

Purpose: To guide and coordinate seismic risk prevention policies throughout France by identifying strategic priorities.

- **1. Awareness-raising and training**

1.1 Training in the application of seismic regulations

1.2 Raising awareness and training for crisis management preparedness (Richter and communal crisis exercises)

- **2. Vulnerability reduction**

2.1 Supporting the application of seismic regulations :

2.2 Developing the diagnosis and reinforcement of existing buildings

- **3. Town and country planning (PPRS)**

3.1 Assessing the effectiveness of PPRSs

3.2 Stabilizing the PPRS methodological framework

- **4. Improving knowledge**

4.1 Defining research and development priorities

4.2 Improving knowledge of hazards, vulnerability and seismic risk

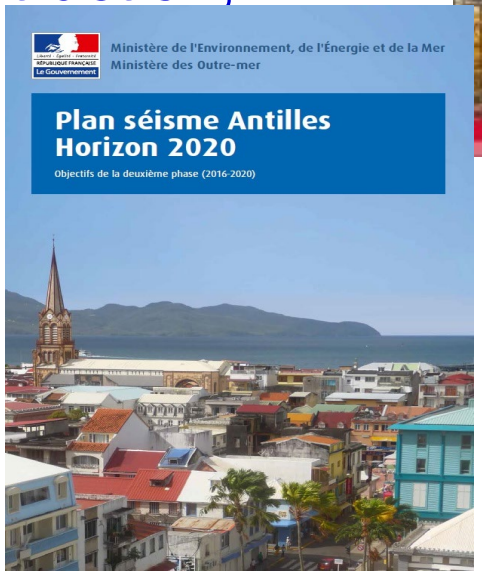
What kind of public prevention policy?

Example of the French West Indies Earthquake Plan (PSA)

Purpose: to **rapidly offer the best possible security to residents of the French West Indies**

The plan mainly involves seismic-resistant construction, reconstruction and reinforcement measures.

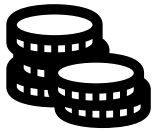
- 1st plan phase (2007-2013)
- 2nd plan phase (2014-2020)
- **3rd plan phase (2021-2027)**



Antilles Earthquake Plan

A government plan to protect populations from earthquake risk

Territories subject to strong seismic hazards and risks.



One billion euros invested in the first two phases of the PSA from 2007 to 2019.

This new phase sets targets for 2027, with a budget of almost €1 billion, including €650 million from the French government.

The 3ème phase of the French West Indies Earthquake Plan

A government plan based on 4 main themes

Focus 1	Carry out work to reduce the vulnerability of buildings and develop an integrated approach to risk.
Focus 2	Support those involved in planning and construction to reduce the vulnerability of buildings.
Focus 3	Develop risk awareness and preventive information.
Focus 4	Improve knowledge of hazards, vulnerability and risk.

The 3ème phase of the French West Indies Earthquake Plan

The main actions implemented: operations to reinforce public buildings

- 1er and 2nd educational establishments
- Social housing
- Health care facilities
- Crisis management infrastructure

Basse-Terre hospital construction site

Building 7 completed - Lamentin

Pointe-à-Pitre sub-prefecture construction site

Seismic risk prevention
Preventive information - educational documents

DDRM, DICRIM, IAL, ...

Financial mechanisms

=> The Fonds de prévention des risques naturels majeurs (**FPRNM), known as the "Barnier Fund**" = to support prevention/protection measures for people and property exposed to major natural hazards.
It does **not** compensate for damage to buildings => insurance system.
Can be mobilized by local authorities, small businesses, private individuals and government departments to preserve human lives + damage prevention measures (framework set by law). The Prefect of the département decides on the allocation of aid (subsidies).

Seismic risk => the FPRNM helps to improve knowledge of risks.

The FPRNM contributes to the financing of the Antilles Earthquake Plan: studies and work to prevent seismic risk on equipment and buildings:
- departmental fire and rescue services ;
- low-cost housing ;
- state-owned buildings used for crisis management ;
- schools.

DGPR

=> For post-disaster assistance, managed by the **DGCL.** Aids such as FARU = **The emergency rehousing fund**
or DSEC = **Solidarity allowance to the municipalities affected by climatic or geological events**.

Not DGPR

Session 3 - Territorial economics of recovery and its anticipation

Olivier Bouc
Prevention Innovation advisor at the Central Reinsurance Fund (CCR)

Adrien Pothon
P&C Earthquake Risk Expert at AXA Group Risk Management P&C

Raffaello Fico
Director of the Special Office for the Reconstruction of the Crater Municipalities of Abruzzo Region hit by an earthquake in 2009.
Appointed by the Italian Presidency of the Council of Ministers.

The French Nat Cat scheme
&
recent earthquakes compensation

Olivier Bouc, CCR

Insurance mechanisms to cover natural risks in France

1. Risks which **can be covered by insurance** (facultative or compulsory) with explicit Terms & Conditions

Private (re)insurance market

Perils covered:

- Storms
- Hailstorms
- Weight of the snow
- Freeze

The border between both categories may evolve over time

2. Risks requiring **specific compensation schemes**

Public funds (National Fund for Agricultural Disasters - 1964 Law)

The National Disaster compensation scheme (1982 Law)

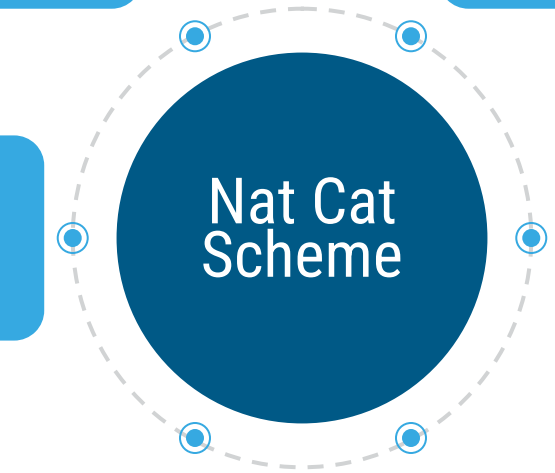
Perils usually covered:

- Floods (surface runoff, overflow, groundwater flooding etc.)
- Cyclonic winds
- **Earthquakes**
- Mudslides and landslides (including subsidence due to drought)
- Tidal waves and tsunamis
- Avalanches
- Volcanic eruptions

What is the National Disaster compensation scheme (« Nat Cat ») ?

- A compensation scheme based on **public-private partnership**, to cover natural events of unusual intensity
- Founded on the preamble of the French Constitution of 1946, stating:
  “the Nation proclaims the **solidarity and equality** of all French people in front of the charges resulting from **national calamities**”
- Based on a **compulsory extension of guarantee** of each insurance contract covering the damage to assets
- Covering all insured people on the basis of a **fixed additional premium rate** (12% of the contract premium)
- Allowing **each household to be covered** against major natural events for a moderate price (mean value **~25€/yr**)
- Financially backed with the unlimited guarantee of the French state
- The release of funding depends on the recognition of the status of Natural Catastrophe at the scale of the municipality, based on homogeneous criteria all across France

Main principles of the French Nat Cat scheme



Solidarity

- Unique additional premium

Large coverage

- Compulsory extension
- High penetration rate
- Multi risks coverage
- Affordable cost

Commitment

- Prevention incentives
- Prevention funding
- Efficient claims handling

Sustainability

- Long-term visibility
- Pre-funded mechanism

Public-Private Partnership (PPP)

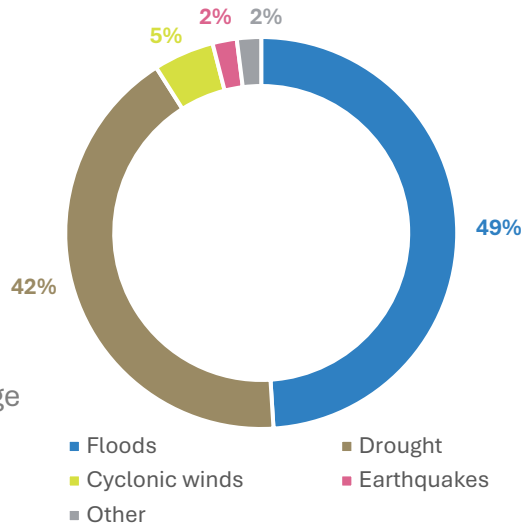
- State-led scheme
- Lean on the insurance market
- Risk sharing

Solvency

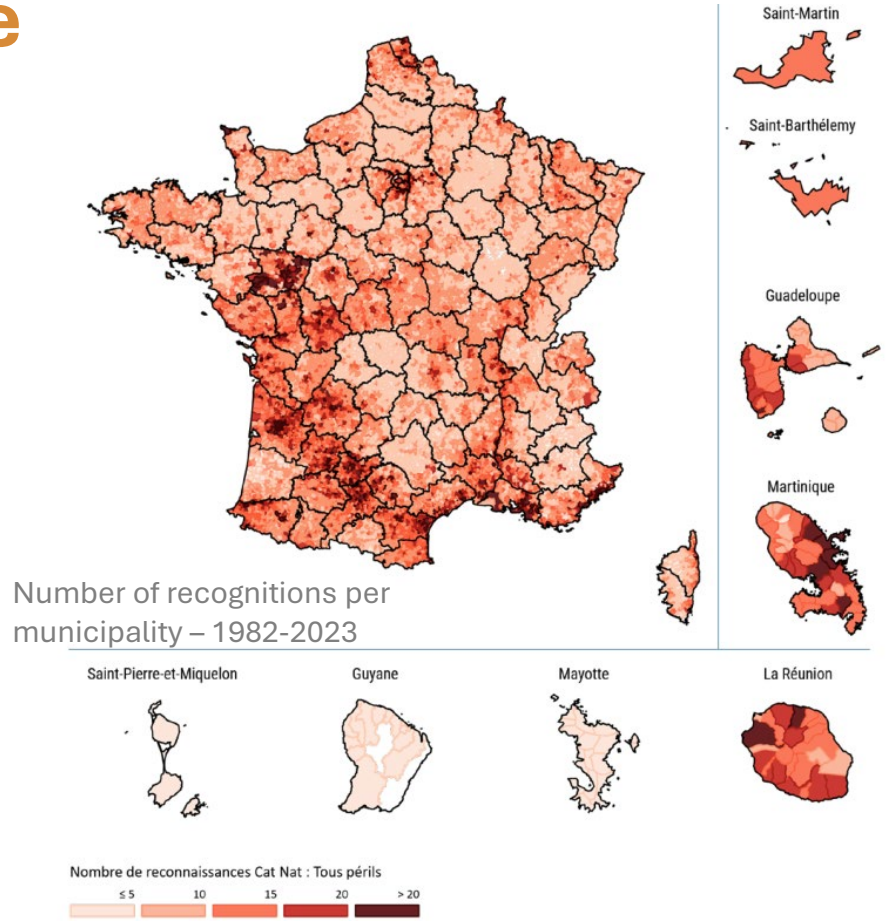
- State guarantee to face exceptional events

Key figures for the Nat Cat scheme

- **€56.6 bn** compensation cost 1982-2023
- Mean value: €1.35 bn/yr
- Cost exceeding €2 bn for 7 out of the last 8 years
- Amount of collected premium in 2023: €2 bn
- Most expensive event: 2022 drought (> €3 bn)



Share of the Nat Cat compensated damage per peril – 1982-2023



Number of recognitions per municipality – 1982-2023

- ~4,500 municipalities recognized under the Nat Cat status each year
- <1% of French municipalities have never been recognized since 1982

Earthquakes in the Nat Cat scheme

- **Criteria** for Nat Cat recognition regarding earthquakes
  - Magnitude **$M_L \geq 5$**
  - **Macroseismic intensity** reached in the municipality **≥ VI**
- 15 earthquakes with significant damage under the Nat Cat status since 1994
  - French Carribean: Les Saintes (2004), Martinique (2007)
  - Mayotte (2018)
  - Alps : Le Grand-Bornand (1994), Menton (1995), Annecy (1996), Laffrey (1999), Barcelonnette (2014)
  - Pyrenees: Saint-Paul-de-Fenouillet (1996)
  - But also assumably less seismic areas: Hennebont (2002), Rambervillers (2003), Chatelaillon-Plage (2016), Tancoigne (2019), Le Teil (2019), La Laigne (2023)…

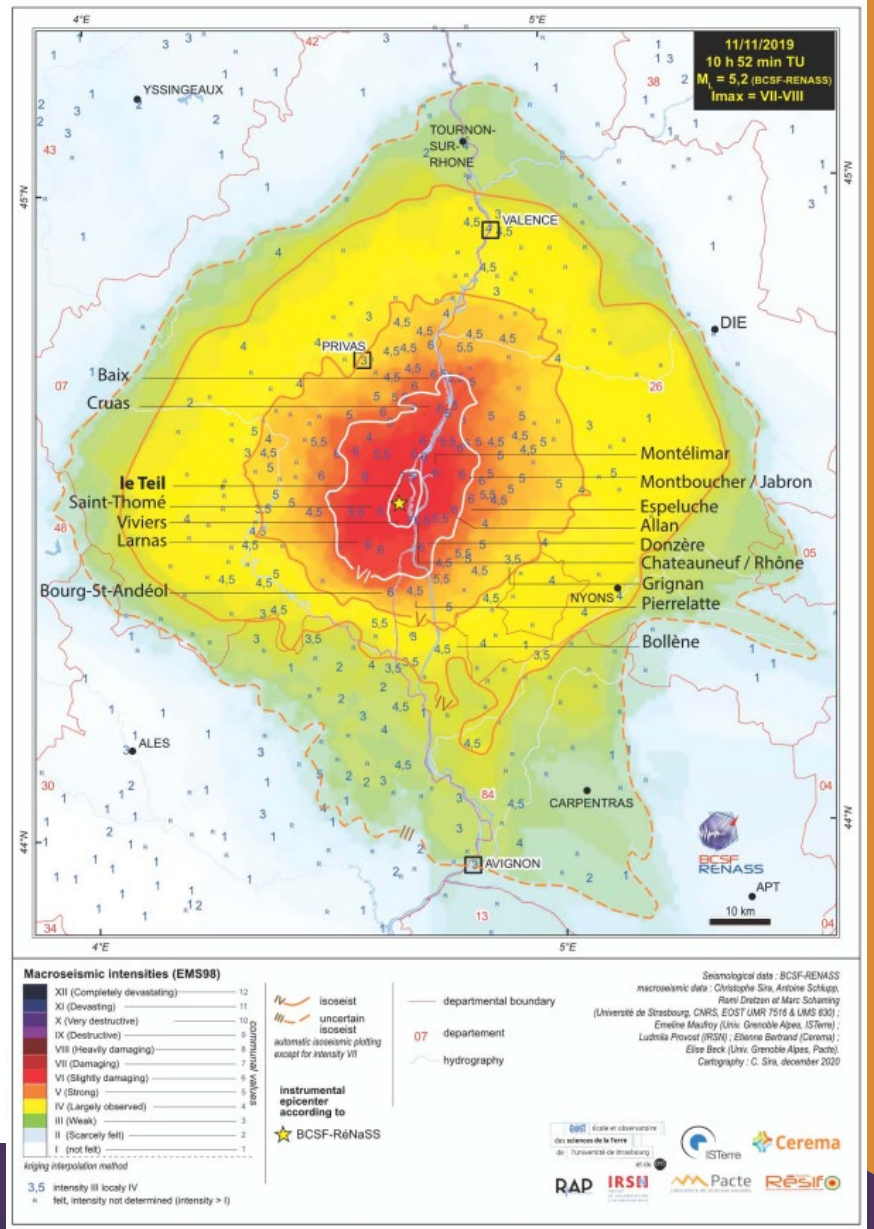
  + other earthquakes with minor damage
- An earthquake in Guadeloupe similar to 1843 would estimatedly cost **€3.3 to 7.7 bn** today

Les Saintes earthquake (Guadeloupe, 2004)

- 21st November 2004
- M_w **6.3** - 13-14 km depth
- Maximum intensity: **VIII** (Les Saintes)
- 32 municipalities recognized as Nat Cat (all of Guadeloupe)
- 95,000 assets exposed
- **59 m€$_{2004}$ insured losses** covered by CCR
  - 29.5 m€$_{2004}$ paid by insurers
  - 29.5 m€$_{2004}$ paid by CCR
- As a comparison: in 2004, the total of **insurance premiums** collected in the 32 recognized municipalities amounted to **4.1 m€$_{2004}$** (7% of the insured losses)

Le Teil earthquake (Auvergne-Rhône-Alpes, 2019)

- 11st November 2019
- M_W **4.9** (M_L > 5) – 1 km depth *(Ritz et al., 2020)*
- Maximum intensity: **VII-VIII** (Le Teil)
- 42 municipalities recognized as Nat Cat
- 85,000 assets exposed
- **234 m€$_{2019}$ insured losses** covered by CCR
  - 117 m€$_{2019}$ paid by insurers
  - 117 m€$_{2019}$ paid by CCR
- 11,500 claims – mean cost = 21 k€$_{2019}$
- As a comparison: in 2019, the total of **insurance premiums** collected in the 42 recognized municipalities amounted to **2.4 m€$_{2019}$** (1% of the insured losses)



Franco-Italian Roundtable - "(Re)building better around seismic risk."

Spatial economics of recovery and its anticipation

The reconstruction experience in the 2009 earthquake crater

SPECIAL OFFICE FOR RECONSTRUCTION
OF THE CRATER MUNICIPALITIES - U.S.R.C.

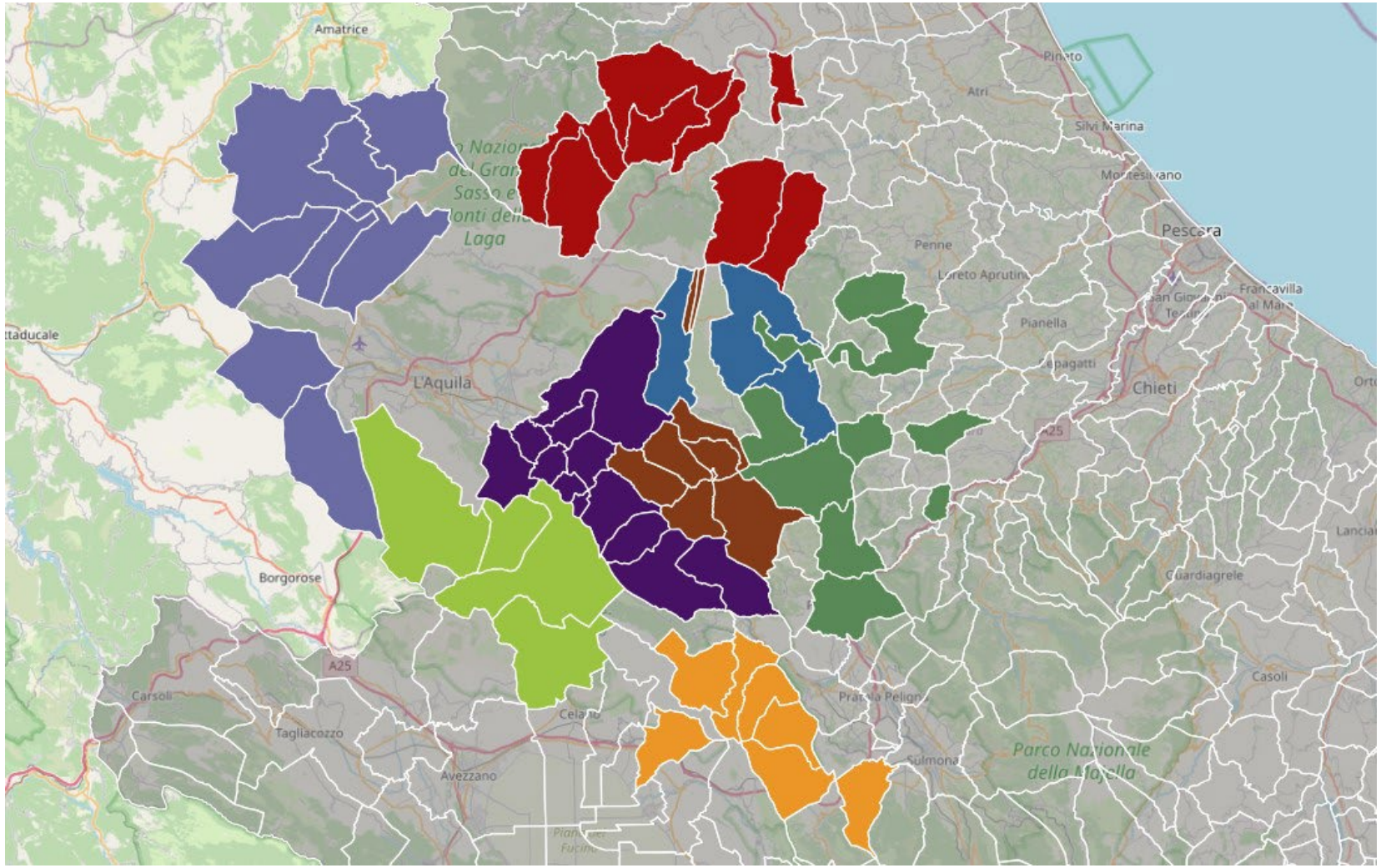
Eng. Raphael Fico
Director of the Special Office for the Reconstruction of the Crater Municipalities.

September 17, 2024

USRC Ufficio Speciale per la Ricostruzione dei Comuni del Cratere

TERRITORIAL ECONOMICS OF RECOVERY AND ITS ANTICIPATION

Territorial extension



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TERRITORIAL ECONOMICS OF RECOVERY AND ITS ANTICIPATION

Summary of contents

USRC Ufficio Speciale per la Ricostruzione dei Comuni del Cratere

TERRITORIAL ECONOMICS OF RECOVERY AND ITS ANTICIPATION

THE ROLE OF THE STATE IN THE RECONSTRUCTION PROCESS FOLLOWING THE 2009 EARTHQUAKE

Overview

Reconstruction Plans

55+1 Municipalities | **3.42 billion**

Private Reconstruction - Inside Crater

56 Municipalities | **4.48 billion**

Private Reconstruction - Outside the Crater

123 Municipalities | **1.03 billion €**

Public Reconstruction
In and out of Crater

80 Municipalities | **179 mln €**

Reconstruction Schools - Plan: 'Schools of Abruzzo'
In and out of Crater

98 Municipalities | **208 mln €**

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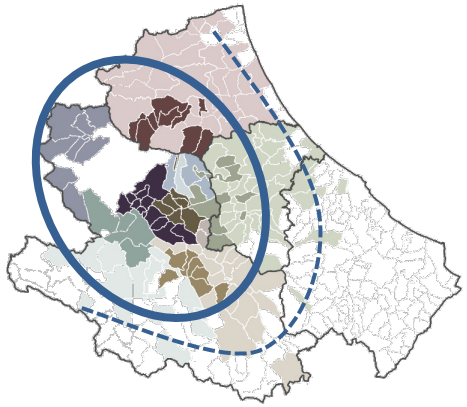
TERRITORIAL ECONOMICS OF RECOVERY AND ITS ANTICIPATION

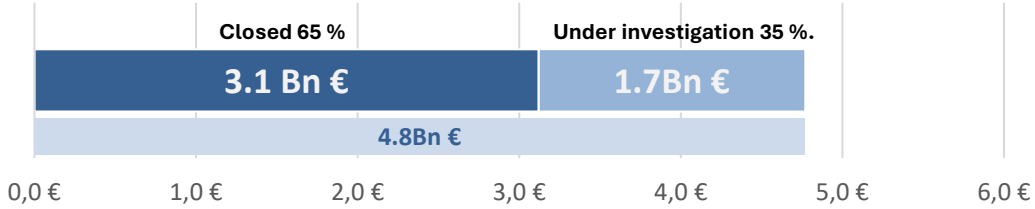
THE ROLE OF THE STATE IN THE RECONSTRUCTION PROCESS FOLLOWING THE 2009 EARTHQUAKE

PRIVATE RECONSTRUCTION



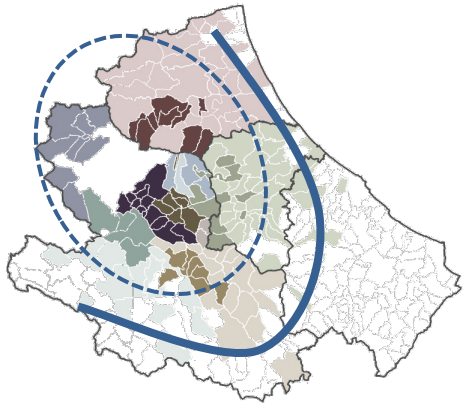
Crater municipalities

(Billion € - Contribution Requests 2009-2024)



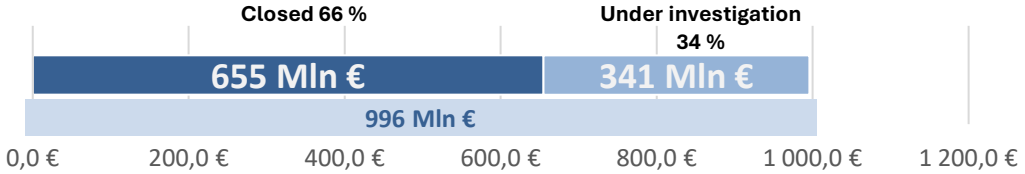
686
ACTIVE CONSTRUCTION SITES

11.850
BUILDINGS RETURNED TO SERVICEABILITY



Municipalities Outside the Crater

(Mln € - Contribution Requests 2009-2024)



248
ACTIVE CONSTRUCTION SITES

2.156
PROPERTIES RETURNED TO HABITABILITY

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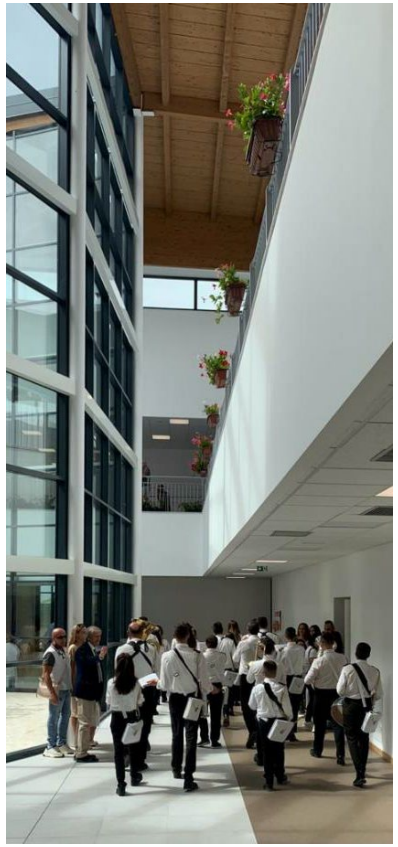
TERRITORIAL ECONOMICS OF RECOVERY AND ITS ANTICIPATION

THE ROLE OF THE STATE IN THE RECONSTRUCTION PROCESS FOLLOWING THE 2009 EARTHQUAKE

PUBLIC RECONSTRUCTION, SCHOOLS AND PROCUREMENT



Public Reconstruction
intervention data 2013-2024

179 MLN € TOTAL

- Town halls
- Cemeteries
- Sports facilities
- infrastructure
- Multifunctional

41 ACTIVE CONSTRUCTION SITES

117 COMPLETED INTERVENTIONS

School Building
intervention data 2013-2024

208 MLN € TOTAL

37 ACTIVE CONSTRUCTION SITES

90 COMPLETED INTERVENTIONS

USRC Contracting Station with Maximum Level of Qualification ANAC 2021-2024
Art. 54 paragraph 2a of DL 77/21 converted by L. 108/21

35 Mln €

12	4	4	19
WORSHIP BUILDINGS	PNRR/PNC INTERVENTIONS	PUBLIC BUILDINGS	TENDER PROXIES

TERRITORIAL ECONOMICS OF RECOVERY AND ITS ANTICIPATION

THE ROLE OF THE STATE IN THE RECONSTRUCTION PROCESS FOLLOWING THE 2009 EARTHQUAKE

PRIVATE RECONSTRUCTION - PRINCIPLES

COMPENSATION NATURE OF THE PRIVATE RECONSTRUCTION GRANT:
[...] the non-repayable grants provided for therein and intended for the reconstruction, repair or purchase of buildings, are granted to individuals or condominiums [*shall be understood*] as **compensation for the restoration of** all or part of the damage caused by the earthquake of April 6, 2009 to privately owned buildings
(DECREE-LAW August 5, 2010 , No. 125, Art. 3-ter)

DIFFERENT CONTRIBUTION BY HOUSING TYPE
100% to properties used as first homes
80% to properties other than the first dwelling only once

SINGLE BUILDING USED AS A FIRST HOME	100% OF THE CONTRIBUTION
SINGLE BUILDING OTHER USE	80% OF THE CONTRIBUTION (ONE TIME ONLY!)
BUILDING AGGREGATES MULTIPLICITY OF PROPERTIES	100% FOR EXTERIOR STRUCTURES AND FINISHES 100% MAIN DWELLING FINISHES 80% FOR DIFFERENT-USE FINISHES (ONE TIME ONLY!)

TERRITORIAL ECONOMICS OF RECOVERY AND ITS ANTICIPATION

THE ROLE OF THE STATE IN THE RECONSTRUCTION PROCESS FOLLOWING THE 2009 EARTHQUAKE

PRIVATE RECONSTRUCTION - PRINCIPLES

BUILDING AGGREGATES
MULTIPLICITY OF PROPERTIES

PHOTO 2
INNER
COURTYARD

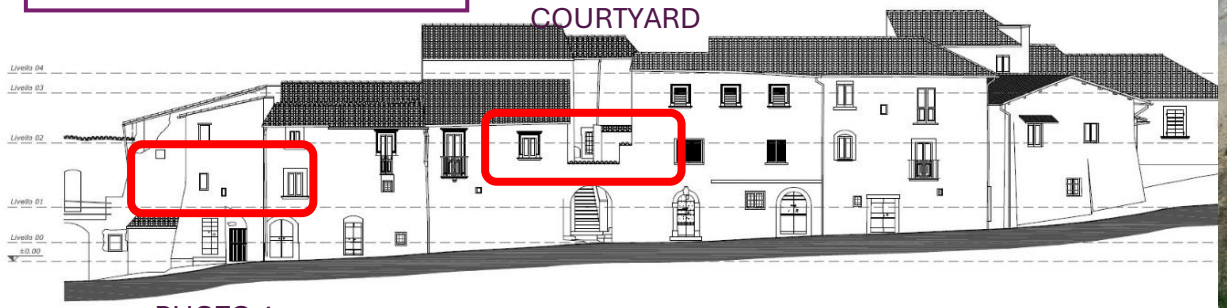


PHOTO 1

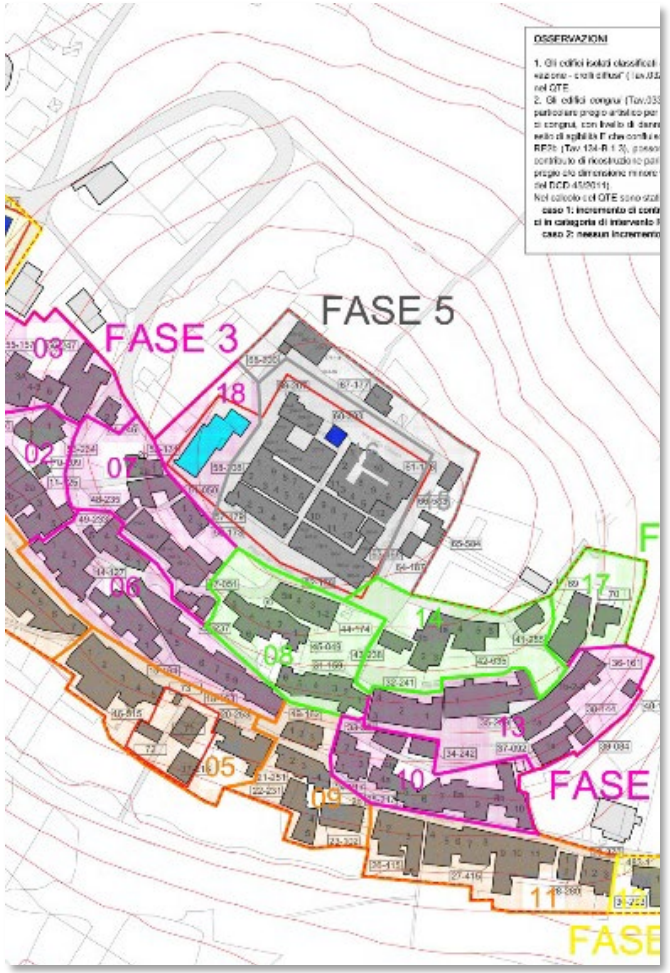
In aggregates, it is not possible to distinguish between walls supporting properties used as first homes and walls supporting properties with other uses.
To restore habitability to the first homes, all structures must be repaired.
Interior finishes are governed by the owner's ownership

In the case of buildings included in unbroken masonry building aggregates, ***unified*** *seismic strengthening or seismic improvement work shall be carried out, regardless of the diversity of fitness classification assigned to individual parts*
OPCM 3820 - **November 2009 (principle set at the beginning of reconstruction)**

TERRITORIAL ECONOMICS OF RECOVERY AND ITS ANTICIPATION

TIME AND PRIORITY MANAGEMENT IN RECONSTRUCTION

Priority Setting through Reconstruction Plans.

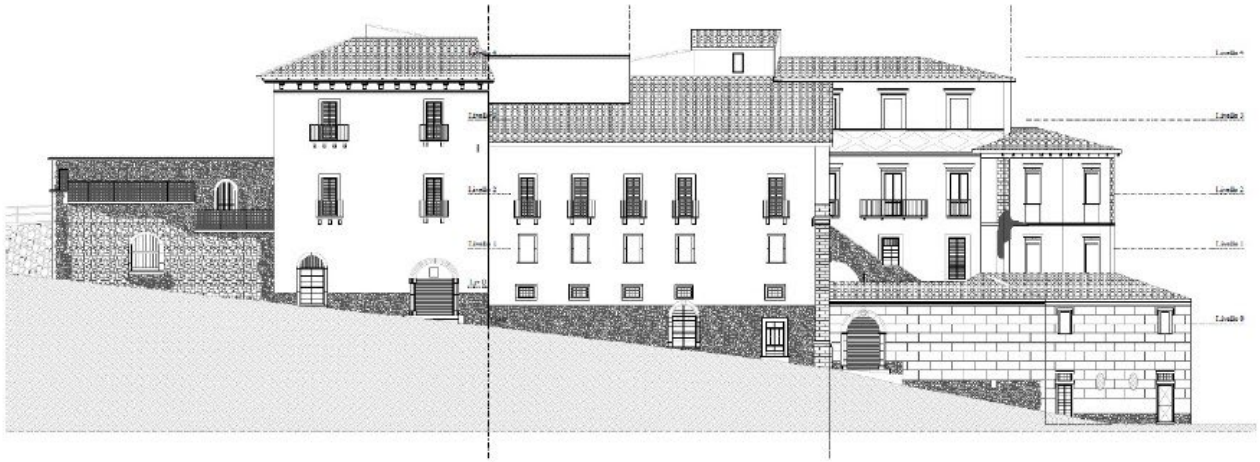


TIMELINE OF INTERVENTIONS WITH IDENTIFICATION OF PRIORITIES

Priority criteria:

1) Return of displaced populations to damaged housing (first homes);
2) Accessibility of places;
3) Workability of interventions;
4) Functionality of network services.

Duration control: complexity of interventions in historic centers



THE COMPLEXITY OF INTERVENING IN THE HISTORIC CENTERS IS AMPLIFIED BY THE PRESENCE OF BUILDING AGGREGATES, INTERCONNECTED, FOR WHICH IT IS COMPLEX TO CANTIERABILIT

TIME AND PRIORITY MANAGEMENT IN RECONSTRUCTION

Duration control: site difficulty and value



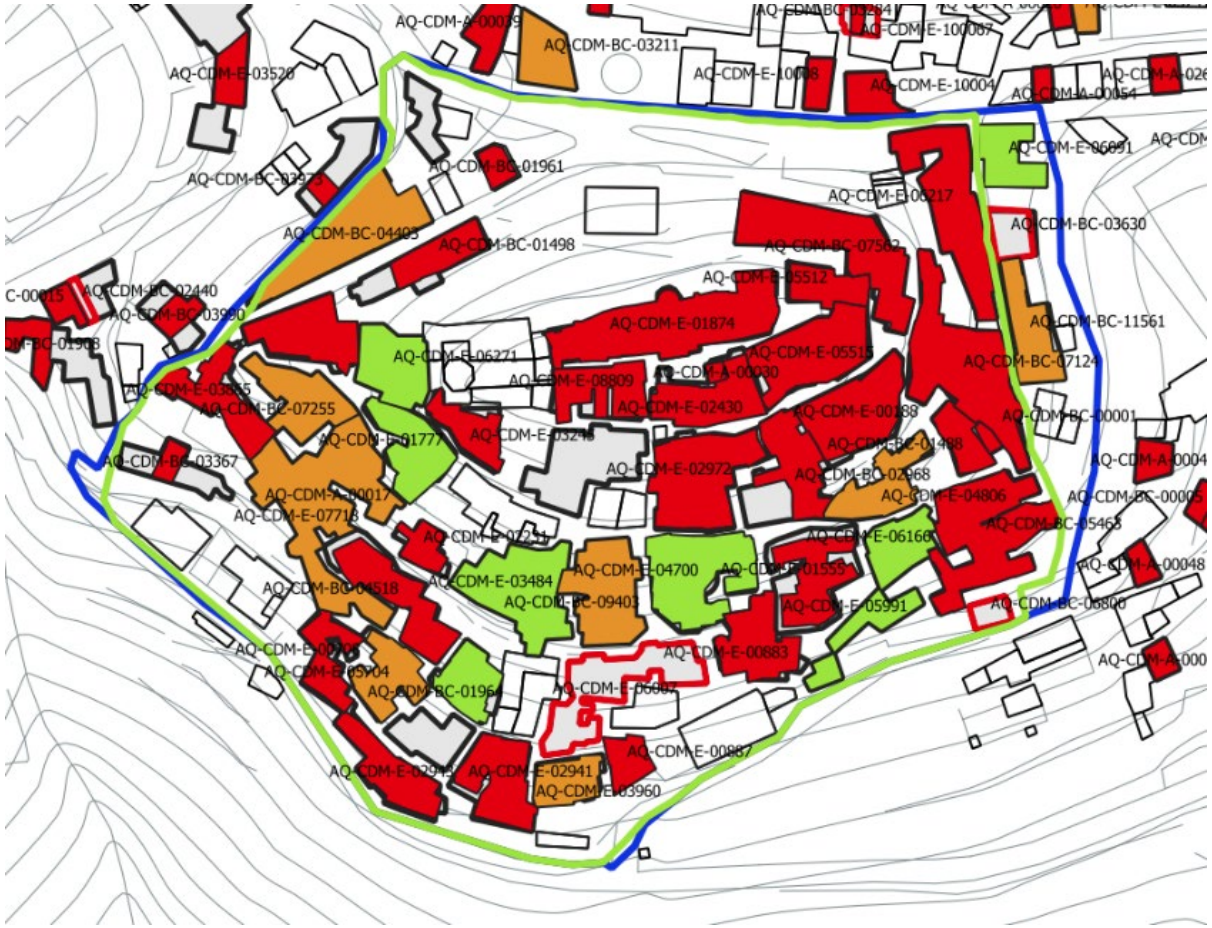



THE NEED TO INTERVENE ON VALUABLE BUILDINGS MEANS MORE TIME FOR THE ATTENTION AND CARE PUT INTO THE APPROACH TO THE WORKS

TERRITORIAL ECONOMICS OF RECOVERY AND ITS ANTICIPATION

TIME AND PRIORITY MANAGEMENT IN RECONSTRUCTION

WEBGIS: Monitoring the implementation of reconstruction.



Legend

- Submitted
- Validated
- Closed (works finished)
- Closed without validation1
- Expected intervention 2009 earthquake
- C.T.R.
- P.D.R. délimitation
- A Zone historical center

1By order of denial or archiving

Duration control: penalties for work delays

Start of work

The notice must be received within 30 days of the grant award.

The time limit for commencement of work for the purposes of applying penalties begins to run, regardless of the actual start of the construction site, thirty days after the grant is awarded.

Penalties

Curtailment of the contribution by 0.5 percent for each month of delay on the granted contribution up to a maximum of 5 percent (Art. 1 paragraph 2 of Decree No. 108/2012).

SAL

The director of works within 15 days after the S.A.L. has been notified of the accrual of the S.A.L. shall forward the accounting documents to the beneficiary, who shall submit them within the next 7 days at the appropriate counter of the municipal offices.

Penalties

- for each month or fraction of a month of delay, a 5% deduction shall be applied to the construction manager from the fees due in relation to the amount of the S.A.L. delivered late.
- For each week and fraction of a week of delay, a 2% deduction is applied to the beneficiary from the total accruals (Art. 11 paragraph 5 bis Decree Law 78/2015).

Duration control: penalties for work delays

Connection to networks
Four months before the estimated completion date, the president/administrator submits an application for connection to the networks.

Penalties
For each month or fraction of a month of delay, a 2% deduction from the total compensation due is applied to the chairperson/administrator.

Certificates of completion of the work and restoration of seismic practicability with preparation and delivery of the final status must be delivered within 30 days after the closure of the construction sites (The date of completion of the work is indicated in the act by which the final grant is granted).

Penalties
Curtailment to administrators/representatives of consortia/commissioners 20% reduction in compensation for the first month of delay and 50% for subsequent months (Art. 11 paragraph 5 Decree Law 78/2015).

End of work (maximum time 2 years plus extensions)
Delay of more than one month of the completion of the work (Art. 6 paragraph 3 OPCM 4013).

Penalties
Reduction of the grant awarded equal to 10% of the installment for payment of the last progress payment; for each month of further delay, an additional 1% reduction is applied up to a maximum of 50% of the installment.

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TERRITORIAL ECONOMICS OF RECOVERY AND ITS ANTICIPATION

THE ROLE OF THE SPECIAL OFFICE FOR URBAN AND LAND REDEVELOPMENT

PRIVATE RECOSTRUCTION

PUBLIC RECOSTRUCTION

URBAN REGENERATION

INFRASTRUCTURAL INTERVENTION

PUBLIC SPACE AND INTERNAL NETWORK

TERRITORY AND CAVITATION SECURITY

NETWORKS AND SERVICE INFRASTRUCTURES

URBAN REGENERATION

NON MATERIAL INTERVENTION

SOCIOECONOMIC SYSTEM

LIVING QUALITY

USRC Ufficio Speciale per la Ricostruzione dei Comuni del Cratere

TERRITORIAL ECONOMICS OF RECOVERY AND ITS ANTICIPATION

THE ROLE OF THE SPECIAL OFFICE FOR URBAN AND LAND REDEVELOPMENT

DEVELOPMENT AND REGENERATION

Restart Development Program
DECREE LAW 78/2015

70 MLN € TOTAL

8 PIT

- Historical, cultural and religious tourism
- Nature tourism
- Tourism of villages, folk traditions and food and wine

8	55	212
HOMOGENIC AREAS.	MUNICIPALITIES	INTERVENTIONS

National Plan complementary to the PNRR
Decree Law No. 59 of May 6, 2021 in Art.1

132 MLN € TOTAL

- Public buildings
- Urban regeneration
- Sports facilities
- Walks
- Road network

17	221	63
TESTED INTERVENTIONS	ONGOING INTERVENTIONS	MLN € TRANSFER

55%

Urban regeneration interventions
D.L.123/2019 converted by L. 156/2019

300 Mln €

Line 1	Line 2	Line 3
PUBLIC SPACES AND ROAD NETWORK	LAND AND CAVITY SECURITY	SERVICE NETWORKS AND INFRASTRUCTURE

TERRITORIAL ECONOMICS OF RECOVERY AND ITS ANTICIPATION

THE ROLE OF THE SPECIAL OFFICE FOR URBAN AND LAND REDEVELOPMENT

TERRITORIAL REGENERATION - PIT: INTEGRATED PROJECTS FOR TOURISM

56 municipalities

8 PIT

241 interventions

About 72 M€

3 thematisms

PIT – Progetti Integrato per il Turismo	PIT IN CORSO		PIT APPROVATI	
PIT AO2 - "Il Ponte tra i Parchi"	10,24	Mln €		
PIT AO3 - "Gran Sasso outdoor e benessere"	8,28	Mln €		
PIT AO4 – "Terre della Baronia"			5,35	Mln €
PIT AO5 – "Le Terre della Pescara"			7,65	Mln €
PIT AO6 – "Altopiano d'Abruzzo: un museo all'aperto"			9,50	Mln €
PIT AO7 – "Il Cammino delle genti"	9,90	Mln €		
PIT AO8 – "La rinascita"	14,64	Mln €		
PIT AO9 - "Altopiano delle Rocche. Terre montane tra sport e natura"	4,56	Mln €		
TOTALE	**47,62**	**Mln €**	**22,50**	**Mln €**
FABBISOGNO FINANZIARIO TOTALE:		**70,12**		**Mln €**

HISTORICAL, CULTURAL AND RELIGIOUS TOURISM

- ARCHAEOLOGICAL AREAS
- CASTLES AND FORTIFICATIONS
- ARCHITECTURAL AND CULTURAL HERITAGE
- ATTRACTIONS OF HISTORICAL AND RELIGIOUS INTEREST

NATURE TOURISM

- PARKS AND NATURE RESERVES
- HISTORICAL-ENVIRONMENTAL ROUTES
- MOUNTAIN TOURISM

TOURISM OF VILLAGES, FOLK TRADITIONS AND FOOD AND WINE

- HISTORICAL VILLAGES
- FESTIVALS AND FOLK FESTIVALS
- HIGH QUALITY TYPICAL PRODUCTIONS

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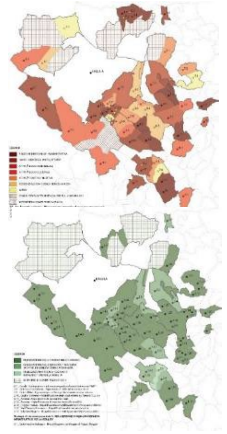
TERRITORIAL ECONOMICS OF RECOVERY AND ITS ANTICIPATION

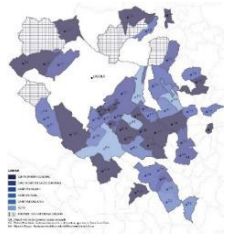
THE ROLE OF THE SPECIAL OFFICE FOR URBAN AND LAND REDEVELOPMENT

TERRITORIAL REGENERATION - PNC
2009 AND 2016 EARTHQUAKE AREAS INTERVENTION PROGRAM

A2, OBJECTIVE 1 Refunctionalization, energy efficiency and mitigation of the seismic vulnerabilities of public buildings	**55 INTERVENTIONS.**	**23.8 millions €**
A3, OBJECTIVE 1 Urban regeneration projects of public open spaces in hamlets, parts of villages and cities	**66 INTERVENTIONS.**	**40.8 millions €**
A3, GOAL 3.a Realization, implementation and consolidation of pathways and cultural, thematic and historical paths	**4 INTERVENTIONS.**	**2.2 millions €**
A3, GOAL 3.c Modernization and securing of sports, recreational and ski-lift facilities	**55 INTERVENTIONS.**	**24.6 millions €**
A4, GOAL 5 Investments on the municipal road network	**56 INTERVENTIONS.**	**16.3 millions €**



Cammini degli altipiani



Total needs: 107.7 millions €

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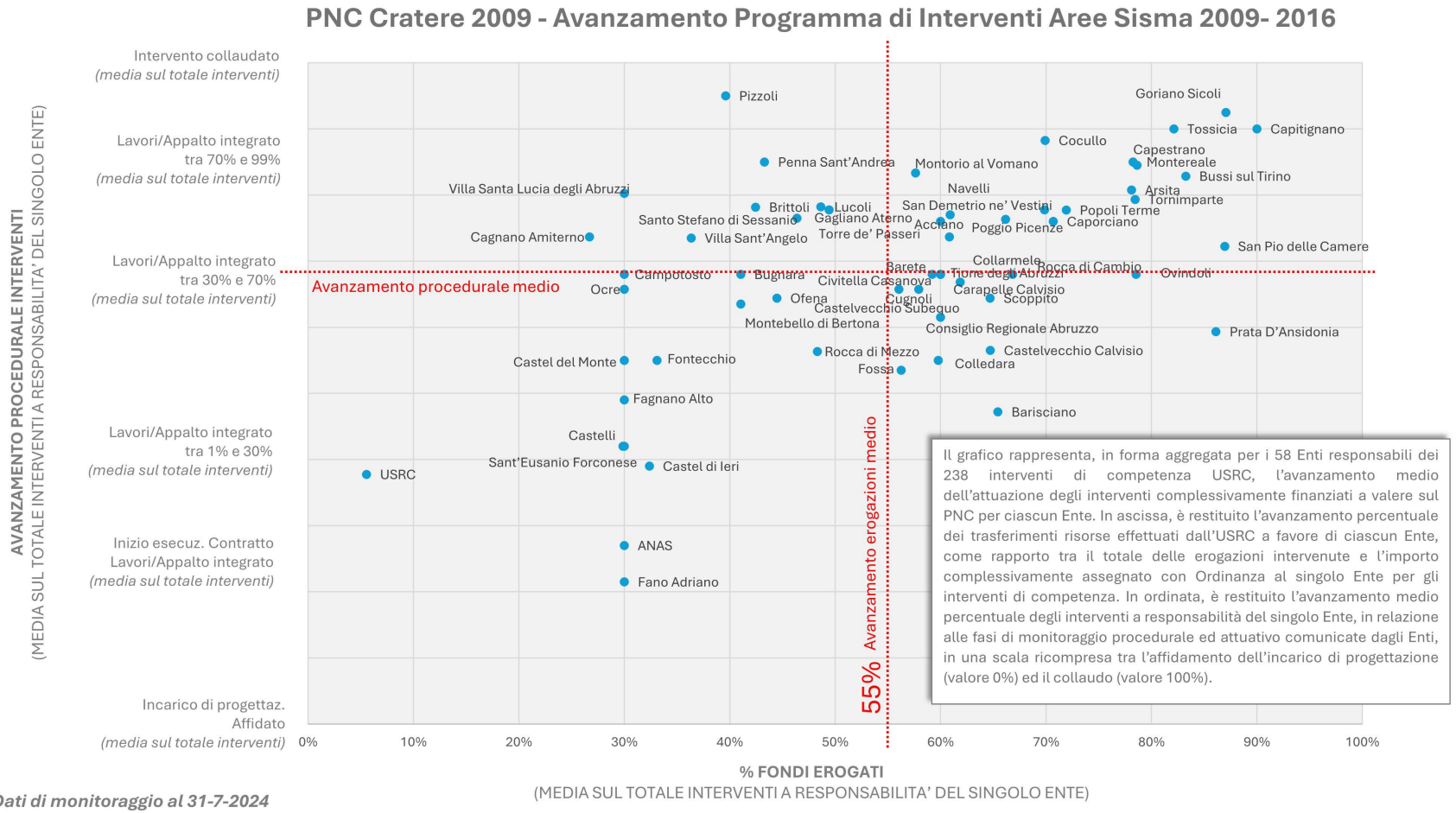
TERRITORIAL REGENERATION - PNC

2009 AND 2016 EARTHQUAKE AREAS INTERVENTION PROGRAM



Il grafico rappresenta, in forma aggregata per i 58 Enti responsabili dei 238 interventi di competenza USRC, l'avanzamento medio dell'attuazione degli interventi complessivamente finanziati a valere sul PNC per ciascun Ente. In ascissa, è restituito l'avanzamento percentuale dei trasferimenti risorse effettuati dall'USRC a favore di ciascun Ente, come rapporto tra il totale delle erogazioni intervenute e l'importo complessivamente assegnato con Ordinanza al singolo Ente per gli interventi di competenza. In ordinata, è restituito l'avanzamento medio percentuale degli interventi a responsabilità del singolo Ente, in relazione alle fasi di monitoraggio procedurale ed attuativo comunicate dagli Enti, in una scala ricompresa tra l'affidamento dell'incarico di progettazione (valore 0%) ed il collaudo (valore 100%).

Dati di monitoraggio al 31-7-2024

USRC Ufficio Speciale per la Ricostruzione dei Comuni del Cratere

TERRITORIAL ECONOMICS OF RECOVERY AND ITS ANTICIPATION

THE ROLE OF THE SPECIAL OFFICE FOR URBAN AND LAND REDEVELOPMENT

INFRASTRUCTURAL REGENERATION

P.I.C.C. CONNECTED and COMPLEMENTARY INTERVENTIONS PROGRAM.

Decree Law No. 123 of October 24, 2019, converted into Law 156/2019

ELIGIBLE INTERVENTIONS

Private Reconstruction

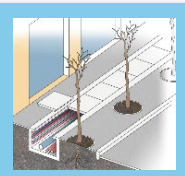
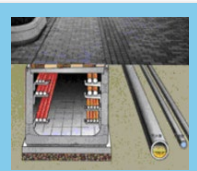
Public Reconstruction

LINE 1 – Public spaces and road network.


LINE 2 – Land and cavity security.



LINE 3 – Networks and service infrastructure.

56
Historic Centers of the Municipalities of the 2009 Earthquake Crater

300 Mln €
Estimated by PDR
Allocated among the 56 municipalities

distribution criteria:
- damage (50%)
- population (25%)
- urbanized surf. (25%)

UNIVERSITÀ DEGLI STUDI DELL'AQUILA

dicea

UNIVERSITY OF THE STUDIES OF L'AQUILA – Ph.D. in Civil Engineering Building Architecture and Environment.

"Smart and Sustainable Urban Infrastructure in the Historic Villages of the 2009 Earthquake Crater. models and low-impact solutions for technological innovation in the implementation, maintenance and management of networks and services in historic centers" drafting **GUIDELINES FOR THE DESIGN OF URBAN – TERRITORIAL REGENERATION IN THE MUNICIPALITIES OF THE 2009 SISMA CRATERE.**

USRC Ufficio Speciale per la Ricostruzione dei Comuni del Cratere

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THE ROLE OF THE SPECIAL OFFICE FOR URBAN AND LAND REDEVELOPMENT

TERRITORIAL REGENERATION

Participatory pathways: "Participatory Listening Project" in Santo Stefano di Sessanio.

OBJECTIVES

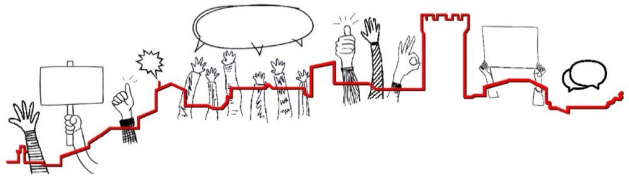
COUNTERING DEPOPULATION

SOCIO-ECONOMIC DEVELOPMENT

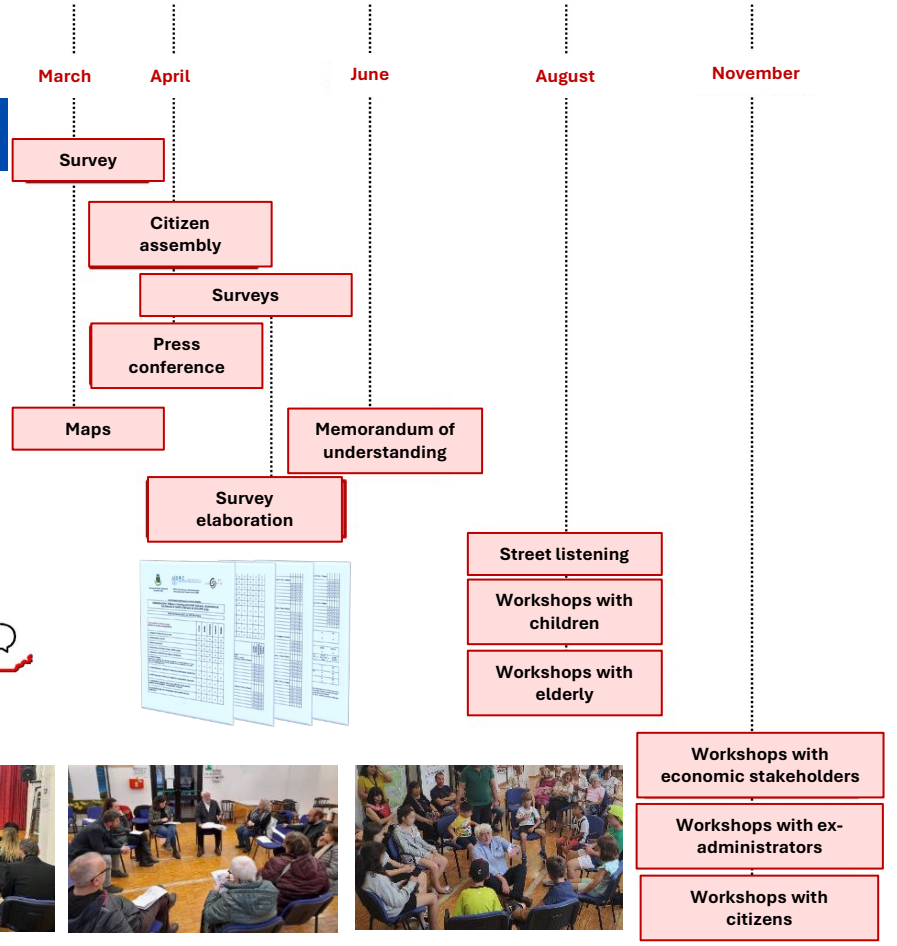
- **5** FIELD SURVEY MAPS
- **7** WORKSHOPS/MEETINGS
- **34** SURVEYS COLLECTED
- **9** MAPS OF PERCEPTIONS
- **159** PARTICIPANTS
- **11** LOGBOOKS

OUTCOMES

FRAMING DOCUMENT FOR URBAN REGENERATION AND PARTICIPATION IN S.S.S.



ACTIONS

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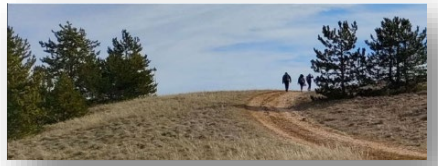
TERRITORIAL ECONOMICS OF RECOVERY AND ITS ANTICIPATION

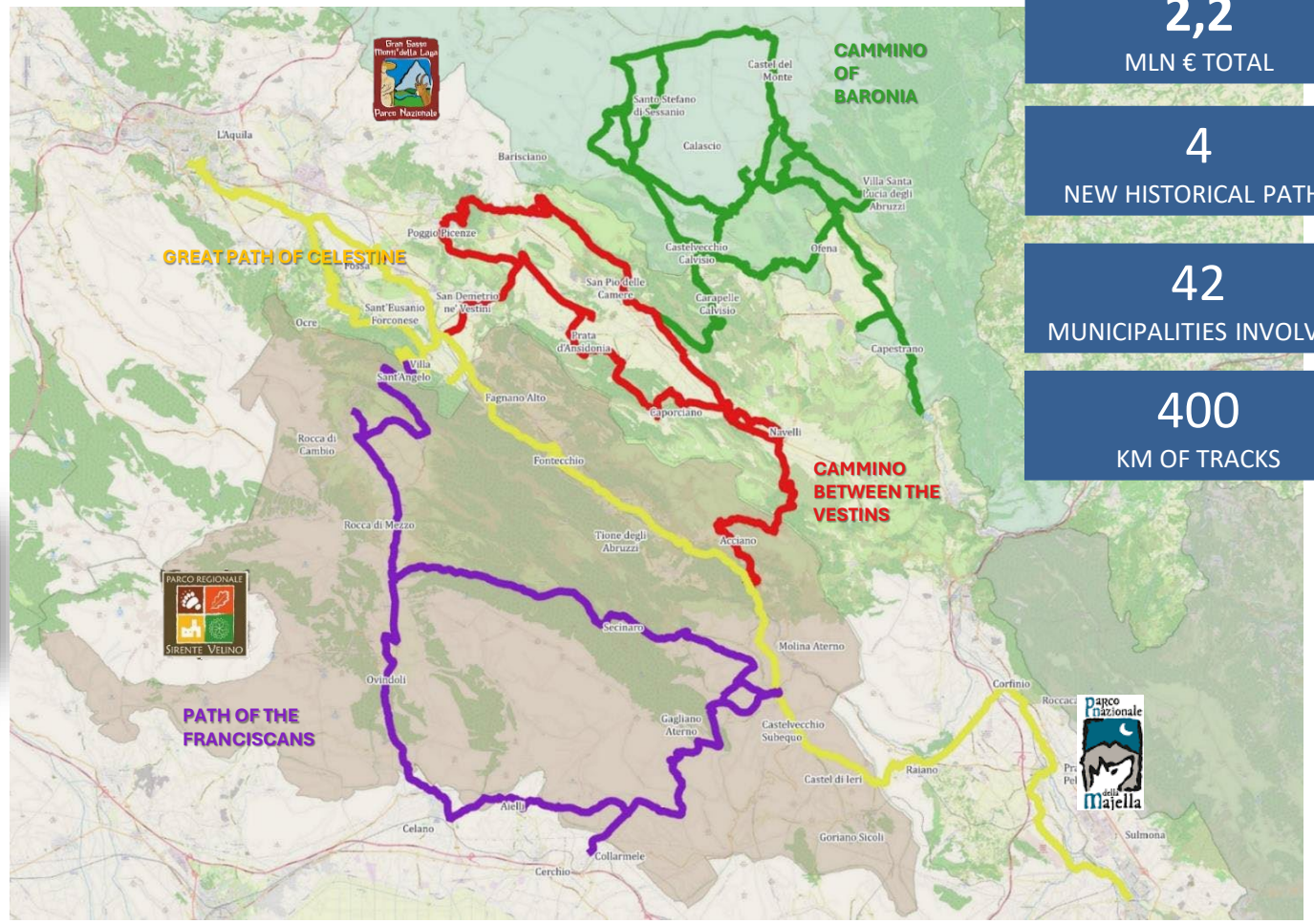
THE ROLE OF THE SPECIAL OFFICE FOR URBAN AND LAND REDEVELOPMENT

TERRITORIAL REGENERATION - PATHS

Cammini degli altipiani



National Plan complementary to the PNRR
Measure A.3, objective 3.a



2,2
MLN € TOTAL

4
NEW HISTORICAL PATHS

42
MUNICIPALITIES INVOLVED

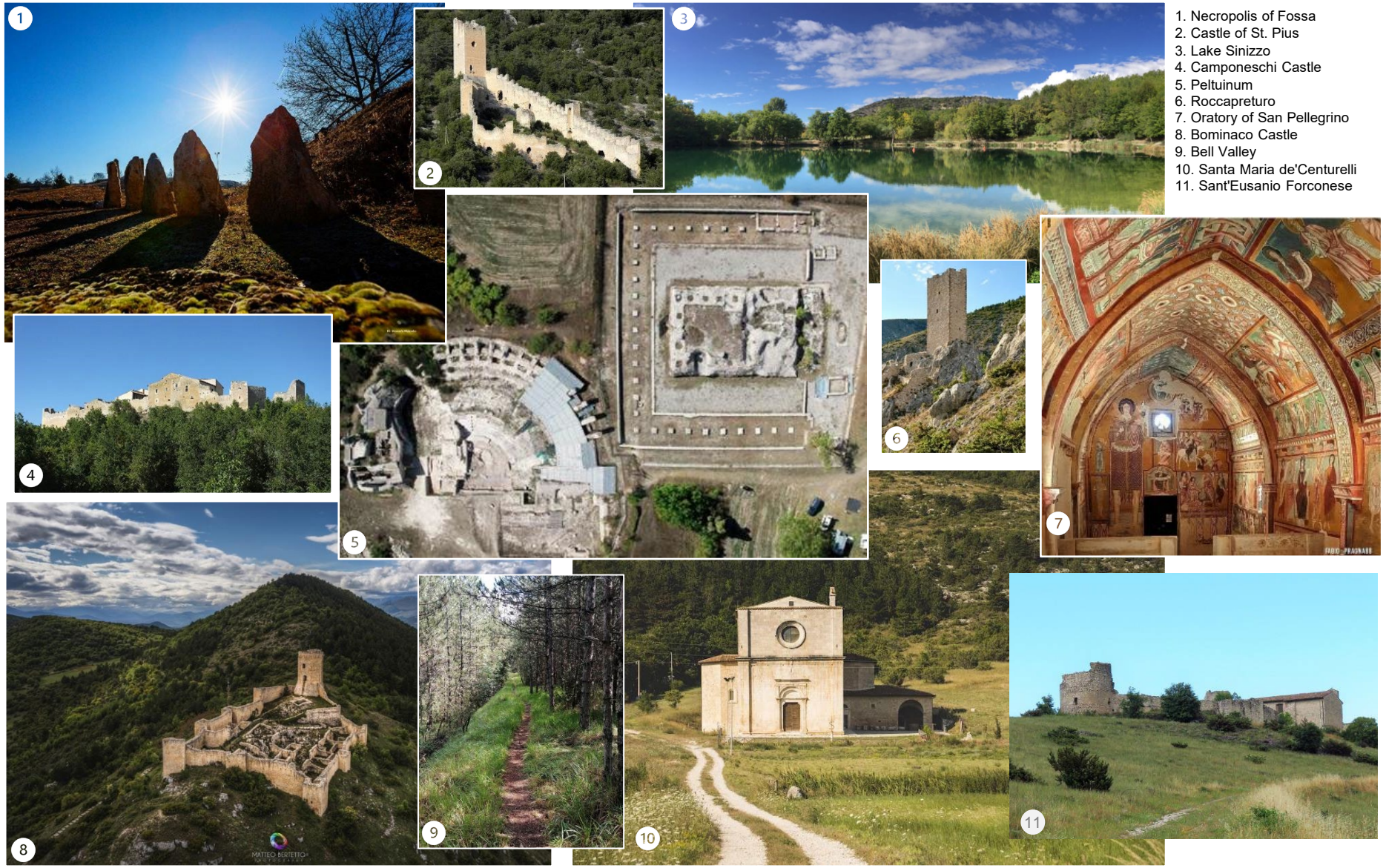
400
KM OF TRACKS

TYPOLOGY OF INTERVENTIONS

- INTERVENTIONS ON TRACKS
- SIGNAGE
- PARKING AREAS.
- BEACONS+APP+PLATFORM TECHNOLOGY

NATIONAL PLAN COMPLEMENTARY INVESTMENT TO THE PNRR

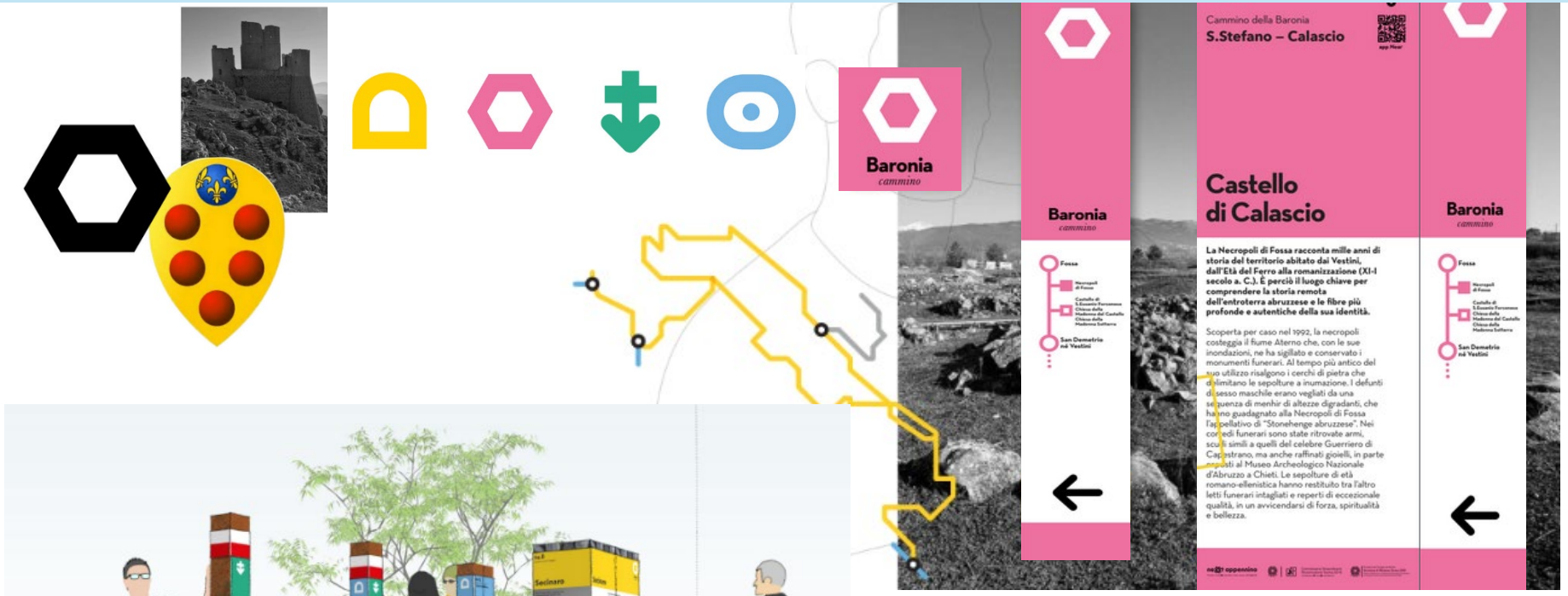
THE PATH BETWEEN THE VESTINI Some glimpses of the crossed places



1. Necropolis of Fossa
2. Castle of St. Pius
3. Lake Sinizzo
4. Camponeschi Castle
5. Peltuinum
6. Roccapreturo
7. Oratory of San Pellegrino
8. Bominaco Castle
9. Bell Valley
10. Santa Maria de'Centurelli
11. Sant'Eusanio Forconese

PNC - Submeasure A3 - Objective 3.A

Visual identity, an example ofapplication



Cammini
degli altipiani

THANK YOU FOR YOUR ATTENTION!

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