

# Global Alliance for Disaster Risk Reduction

–Knowledge and Education–

‘Sharing Experiences on Safer School  
Initiatives around the World’

Successful Initiative on Safe  
Educational Facilities

Prof. Stefano Grimaz



## ASSESS Project

ANALYSIS OF SEISMIC SCENARIOS OF SCHOOLS  
IN THE FRIULI VENEZIA GIULIA REGION (I)  
FOR THE DEFINITION OF STRATEGIES FOR RISK MITIGATION

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*PROJECT FOUNDED BY THE CIVIL PROTECTION OF FRIULI VENEZIA GIULIA REGION (I)*



*DEVELOPED BY*



Istituto Nazionale di Oceanografia e Geofisica Sperimentale di Trieste (I)



Università degli Studi di Trieste (I)

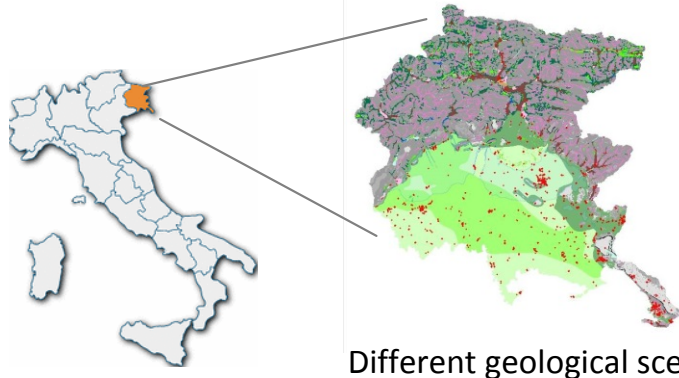


Università degli Studi di Udine (I)

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*Prof. Stefano Grimaz – University of Udine (I) - Project Coordinator*

**WHERE** Friuli Venezia Giulia  
N-E of Italy



**WHAT**

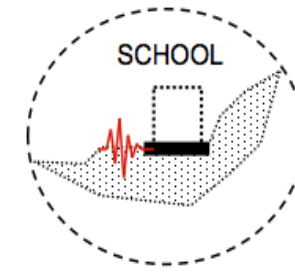
Various structural typologies



**1022**  
SCHOOLS

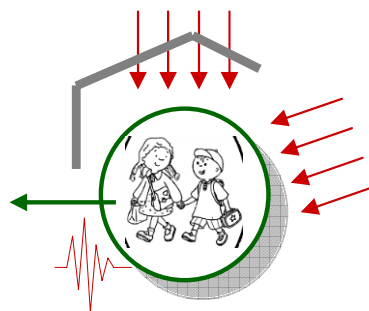
Different geological scenarios

**Seismic Scenario**



**SITE-BUILDING  
SCENARIO**

**HOW** **Seismic Safety** assessment required to consider **every situation that can cause injuries or deaths as a consequence of an earthquake.**



**SAFETY ISSUES**

Site

*Site effects, soil amplification, landslides, ...*

Structural

*Response of structural elements (global and local)*

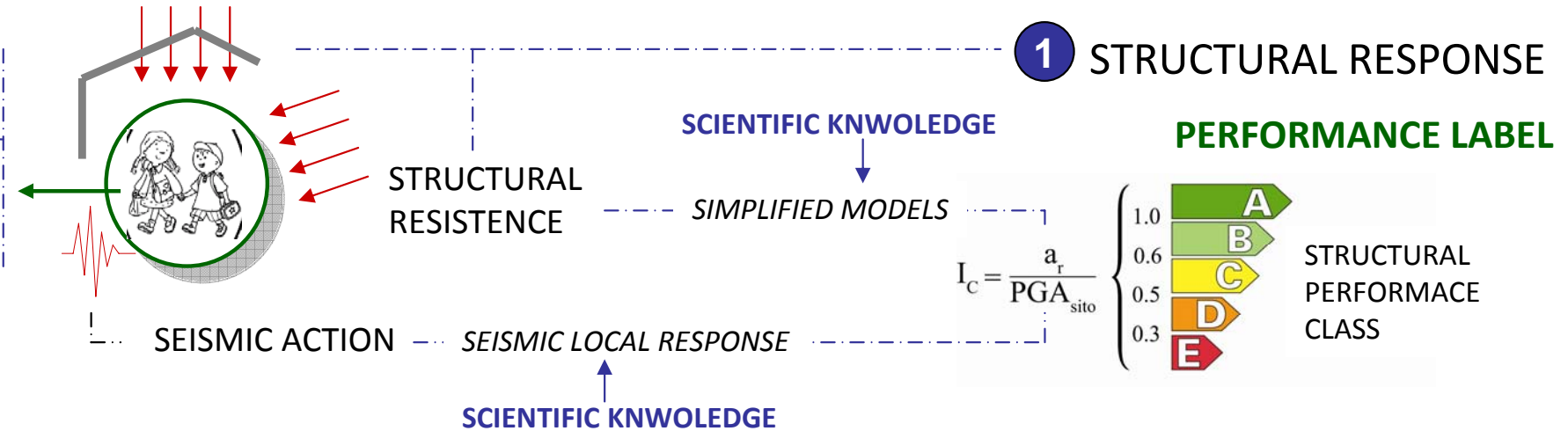
Non-structural

*Response of non-structural elements*

Operational

*Emergency systems, escape ways (internal and external)*

## HOW



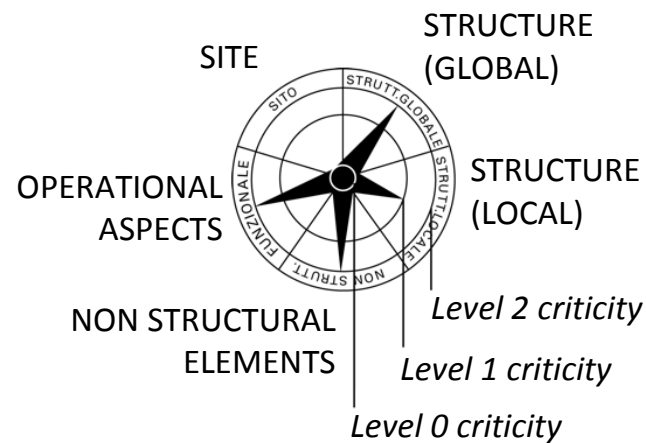
## 2 CRITICISMS AND INTERVENTION NEEDS

### SCIENTIFIC KNOWLEDGE

### VISUS METHODOLOGY



### ROSE OF INTERVENTION NEEDS



### Level 0

No retrofitting is needed

### Level 1

Retrofitting needed to avoid difficult situations for people safety

### Level 2

Retrofitting needed to avoid havey consequences for people safety

## GLOBAL SAFE-INDICATOR



### GLOBAL JUDGEMENT OF SEISMIC SAFETY



#### Criterion of assignment of the safety stars (scenario-dependent)

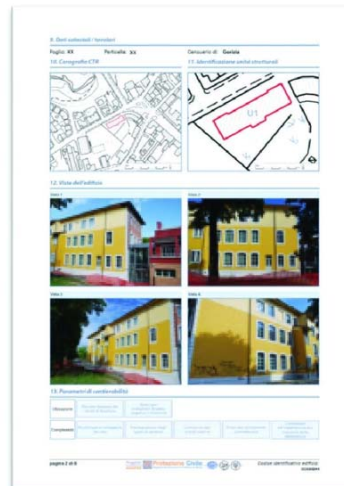
- ☆ ☆ ☆ ☆ ☆  
Unsuitable site  
(even one serious 2 Level criticism)
- ★ ☆ ☆ ☆ ☆  
Suitable site  
(absence serious 2 Level criticisms)
- ★ ★ ☆ ☆ ☆  
Class D structural performance
- ★ ★ ★ ☆ ☆  
Class C structural performance  
and absence of evident local structural, non structural,  
and operational deficiencies
- ★ ★ ★ ★ ☆  
Class B structural performance  
and absence of non structural deficiencies
- ★ ★ ★ ★ ★  
Absence of operational deficiencies

## ASSESSMENT REPORTING

general description



localization



hazard and geo-morphological characterization



ATLAS



analyses  
results

brief  
report

graphic  
indicators

site response

simplified structural analysis

criticisms and intervention needs







## CHARACTERIZATION LIST OF THE SEISMIC SAFETY OF SCHOOLS



### ADMINISTRATOR CONCERNS

**WHICH SCHOOL NEEDS TO BE ADEQUATE FIRST?**

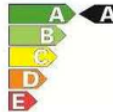



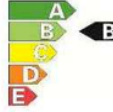







**WHY?**

**WHAT KIND OF INTERVENTIONS ARE NECESSARY?**

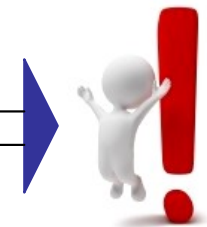
**HOW MUCH DOES THE RETROFITTING COST?**

**HOW MANY INTERVENTIONS ARE FEASIBLE WITH THE AVAILABLE RESOURCES?**

**HOW SHOULD WE COMMUNICATE THE RISK LEVEL TO THE PEOPLE?**

SCHOOL ID	SCHOOL TYPOLOGY	STRUCTURAL PERFORMANCE CLASS	INTERVENTION REQUIREMENT ROSE	ASSESS SAFETY STARS	COSTS (K€)
GO 000 XXX	Preschool			★★★★★★	0
GO 000 XXX	Preschool			★★★★☆☆	Technical verification
GO 000 XXX	Primary school			★★★☆☆☆	47÷63
GO 000 XXX	Secondary school			★★★☆☆☆	1.380÷1.870
GO 000 XXX	High school			★☆☆☆☆	2.300÷3.150
PN 000 XXX	Primary school			★★★☆☆☆	920÷1.250

**KEYS FOR ANSWERS**



## LESSON LEARNT FROM ASSESS EXPERIENCE

### IMPORTANCE OF

- ✓ **HOLISTIC APPROACH** (GLOBAL SEISMIC SAFETY)
- ✓ **MULTIDIMENSIONAL SAFETY CHARACTERIZATION OF THE SCENARIO AS DECISION MAKING SUPPORT TOOL** FOR ADMINISTRATORS AND SAFETY MANAGERS
- ✓ **USE OF “COMMUNICATIVE” SAFE-INDICATORS FOR TRANSFERRING SCIENTIFIC RESULTS** OF ASSESSMENT AND FOR INCREASING AWARENESS ON THE SEISMIC PROBLEM

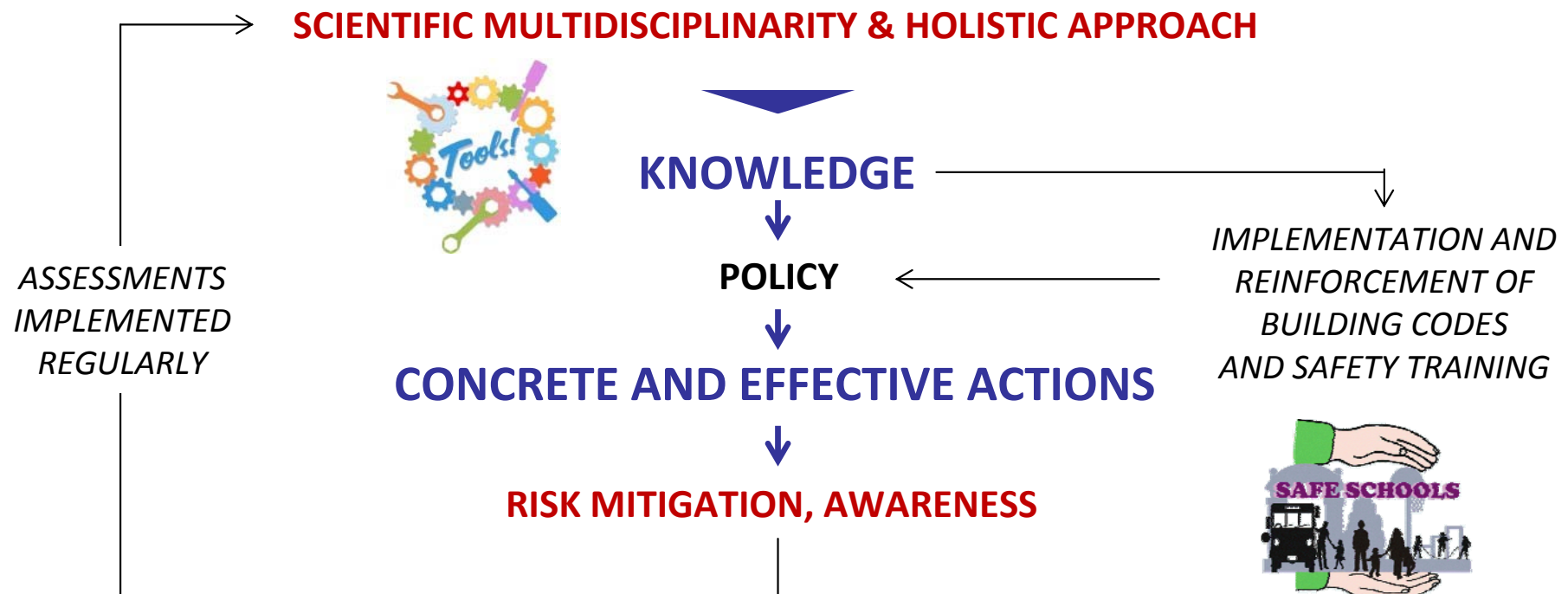


SIGNIFICANCE OF DIFFERENT SKILLS AND KNOWLEDGE IN THE FIELD OF SAFETY

**IMPORTANCE OF A SCIENTIFIC INTERDISCIPLINARY APPROACH** FOR AN EFFECTIVE RISK REDUCTION, MAINLY AT TERRITORIAL SCALE



- 1 IMPORTANCE OF **SUPPORTS** FOR **DECISION MAKING** BY PROVIDING **SCIENTIFIC KNOWLEDGE IN A MULTIDISCIPLINARY WAY** SUCH AS INFORMATION ON SEISMIC STRUCTURAL SAFETY, SITE, NON STRUCTURAL AND OPERATIVE ASPECTS, ETC IN ORDER **TO DEFINE PRIORITIES AND INTERVENTION NEEDS**
- 2 **KNOWLEDGE COMPONENT** MUST BE FULLY INTEGRATED IN A **HOLISTIC APPROACH** WHICH INCLUDES NON-TECHNICAL ASPECTS AS **EDUCATION** AND **MANAGEMENT** IN ORDER TO OBTAIN A **VIRTUOUS SAFETY PROCESS**:



# MANY THANKS FOR YOUR KIND ATTENTION!

*for contacts*

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*for more information on ASSESS Project*

*<http://sprint.uniud.it>*