



UNESCO Office Jakarta
Masterclass on Disaster Mitigation
30 August 2017

Visual Inspection for Defining Upgrading Strategy (VISUS), a Science Based Assessment Methodology for School Safety



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Global Frameworks

Sustainable Development Goals



Sendai Framework for Disaster Risk Reduction

1 OUTCOME
The substantial reduction of disaster risk and losses in lives, livelihoods and health in the economic, physical, social, cultural, environmental, and human-made components of societies

1 GOAL
Protect lives and livelihoods through the Sendai Framework, improved and coordinated economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures that prevent and reduce disaster exposure and vulnerability to disaster, increase preparedness for disaster and incident, and that strengthen resilience.

4 PRIORITIES

- Understanding disaster risk
- Strengthening disaster risk governance to manage disaster risk
- Improving disaster preparedness for effective response and "Build Back Better" in recovery, rehabilitation and reconstruction
- Enhancing disaster preparedness for effective response and "Build Back Better" in recovery, rehabilitation and reconstruction

7 TARGETS

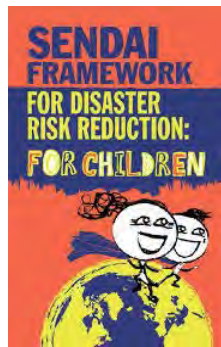
- DISASTER MORTALITY BY 2030
- NUMBER OF AFFECTED PEOPLE BY 2030
- ECONOMIC LOSSES BY 2030
- INFRASTRUCTURE DAMAGED BY 2030
- INTERNATIONAL/LOCAL STRATEGIES BY 2030
- INTERNATIONAL COOPERATION BY 2030
- DRS AND DR INFORMATION BY 2030

Comprehensive School Safety Framework



The new Agenda:

25. (...) We will strive to provide children and youth with a nurturing environment for the full realization of their rights and capabilities, helping our countries to reap the demographic dividend, including through **safe schools** and cohesive communities and families.





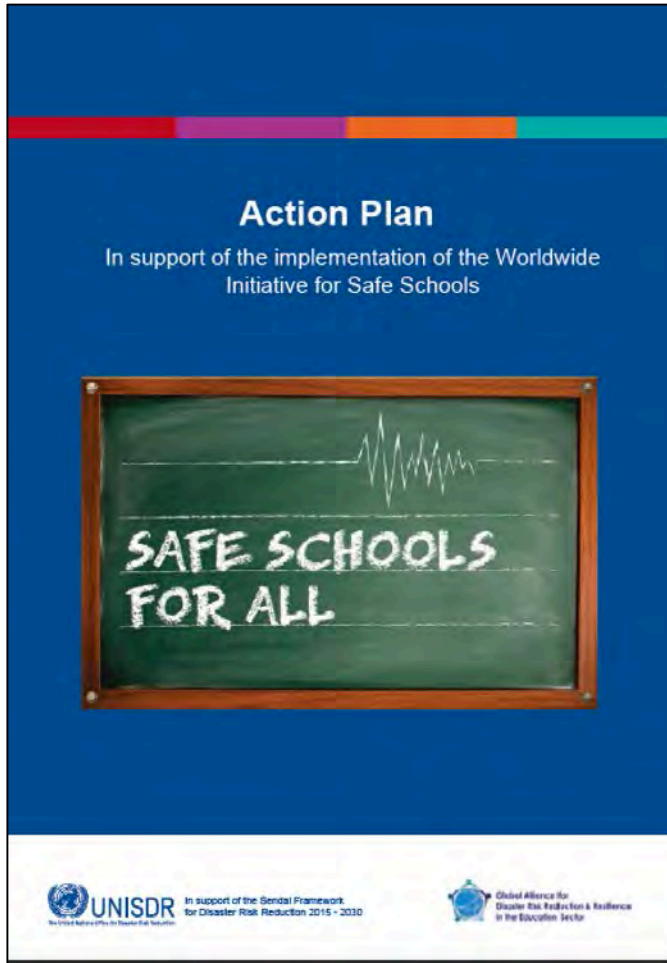
Worldwide Initiative for Safe Schools

The Global Alliance for Disaster Risk Reduction and Resilience in the Education Sector (**GADRRRES**) is a multi-stakeholder mechanism composed of UN agencies, international organizations, and global networks.





Worldwide Initiative for Safe Schools



- Algeria
- Armenia
- Brazil
- Cambodia
- China
- Costa Rica
- Croatia
- Ecuador
- Finland
- Georgia
- Honduras
- Indonesia
- Italy
- I.R. Iran
- Japan
- Kazakhstan
- Kyrgyzstan
- Lao PDR
- Lebanon
- Madagascar
- México
- Nepal
- Nigeria
- Panama
- Philippines
- Qatar
- South Africa
- St Vincent & the Grenadines
- Thailand
- Tunisia
- Turkey
- Turkmenistan
- USA

As of Dec. 2015



Safe Learning Facilities

- Every new School is a SAFE school: Safe school sites and implement disaster-resilient design and construction
- All Schools assessed: Implement prioritization schema for retrofit and replacement

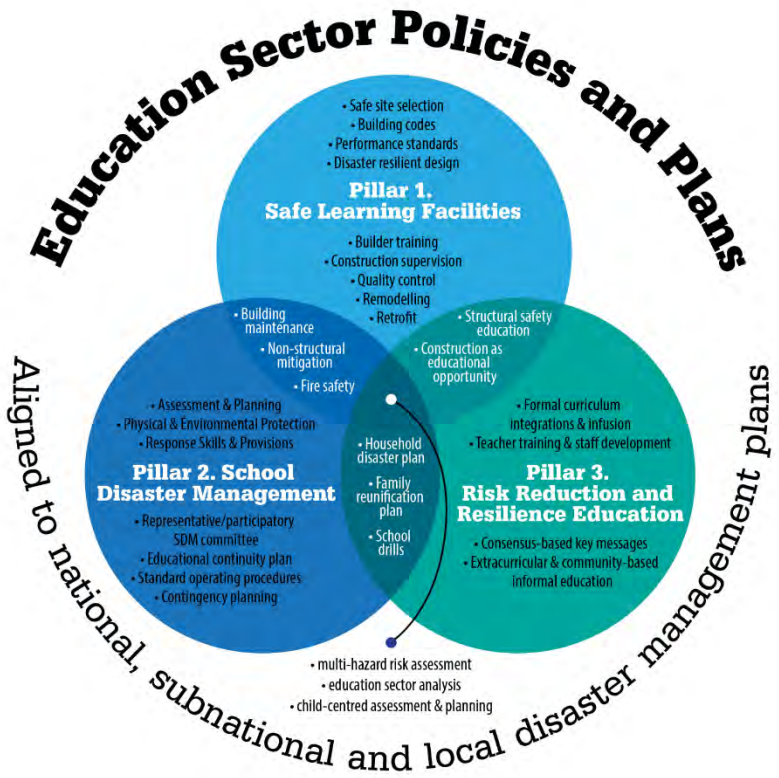
By 2030 every school (Old and New) is a “SAFE SCHOOL”



Wikipedia 2010



Comprehensive School Safety Framework



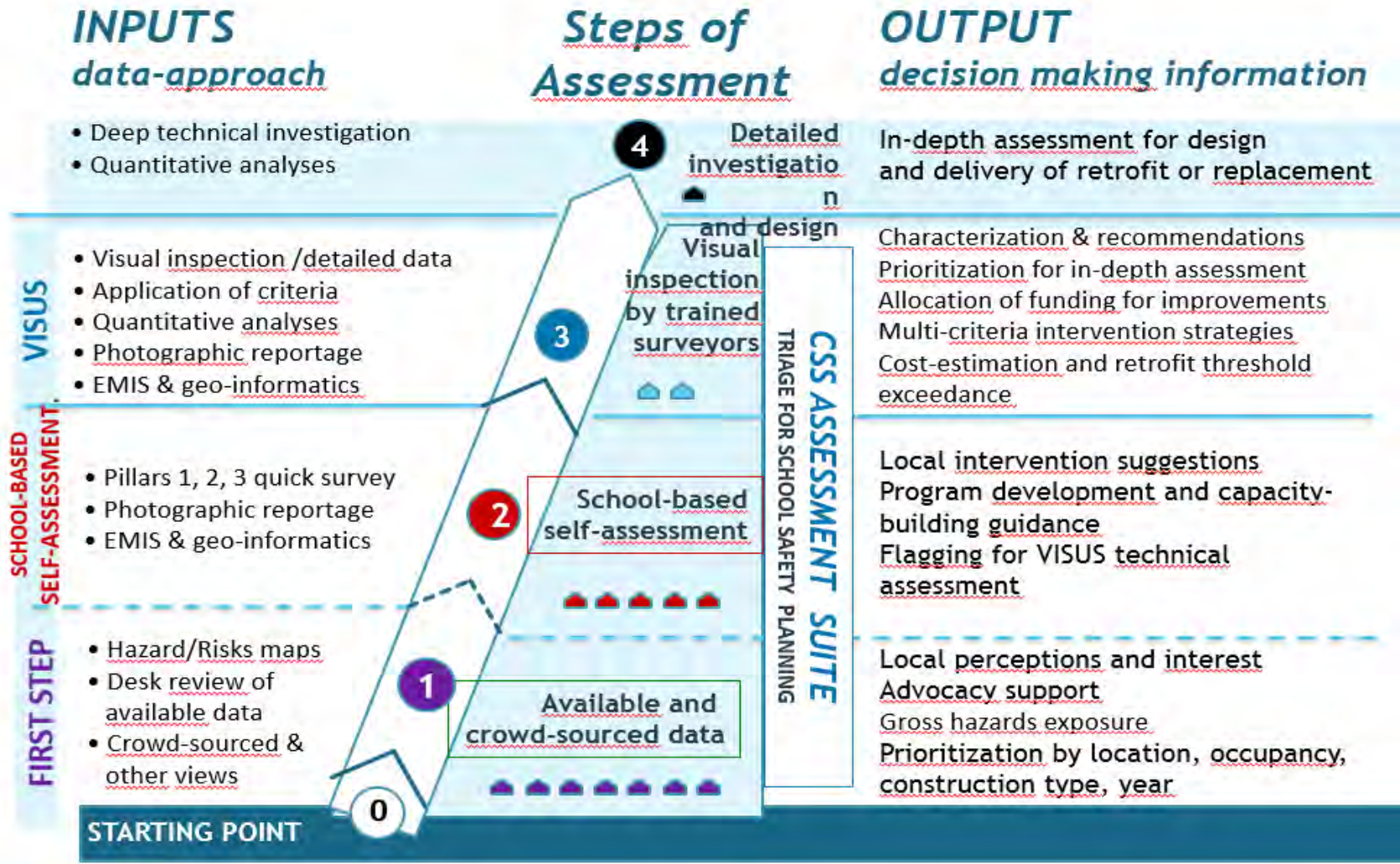
Goals of Comprehensive School Safety

Student and Staff Protection

Safeguard Educational Investments

Assure Educational Continuity

Promote a Culture of Safety and Resilience



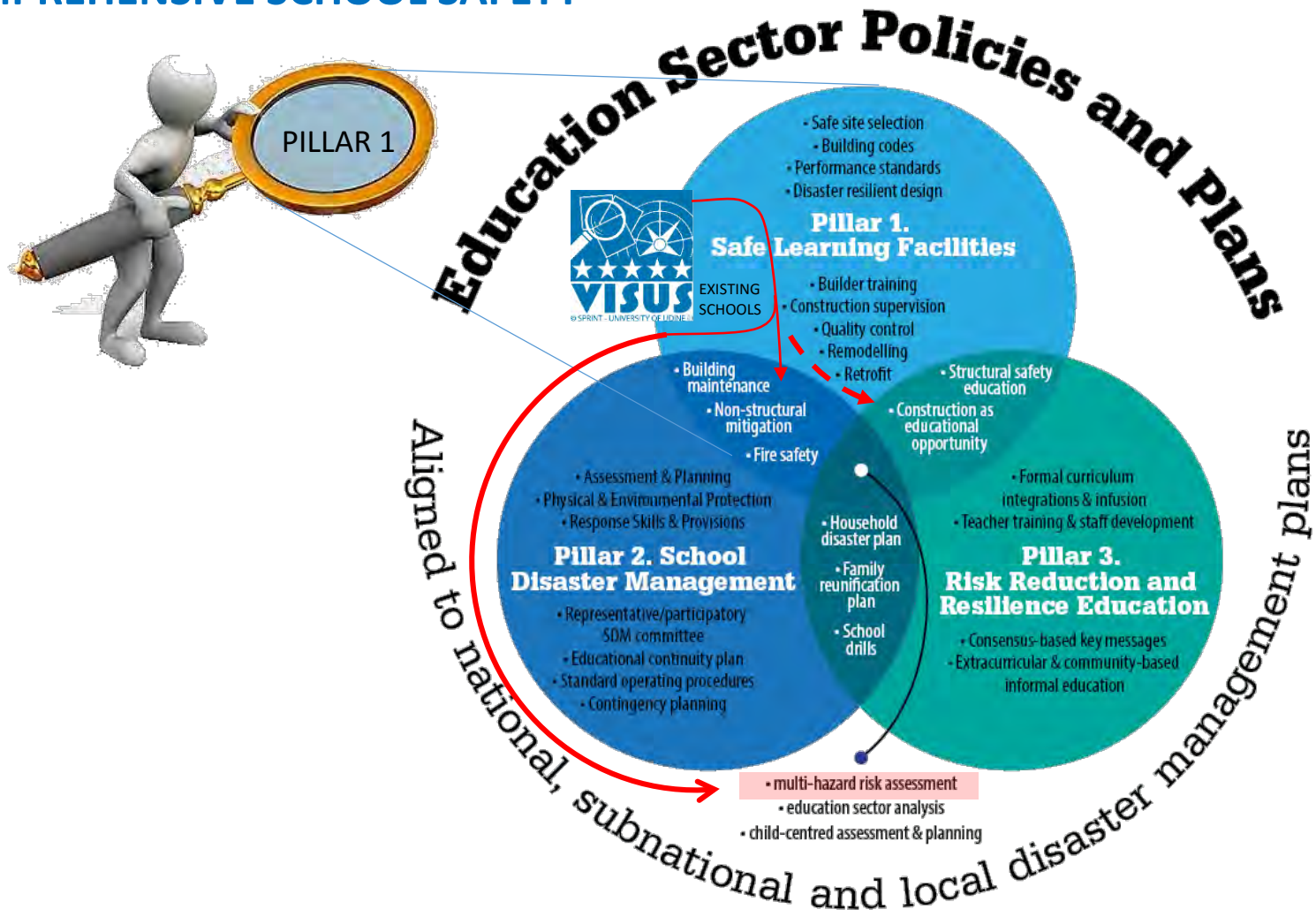


SAFETY GOALS

- LIFE SAFETY (CHILDREN, TEACHERS, AND WORKER)*
- CONTINUITY (EDUCATION ACTIVITIES)*
- LOSS PREVENTION (SAFEGUARD OF INVESTMENTS)*

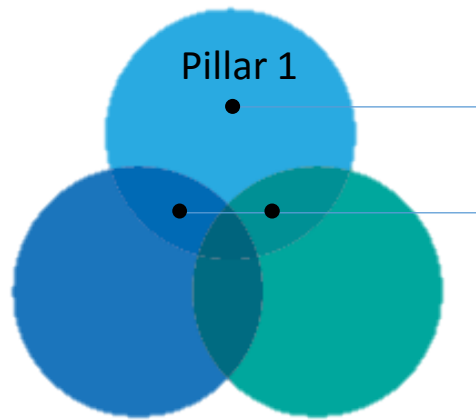


THE THREE PILLARS OF THE COMPREHENSIVE SCHOOL SAFETY

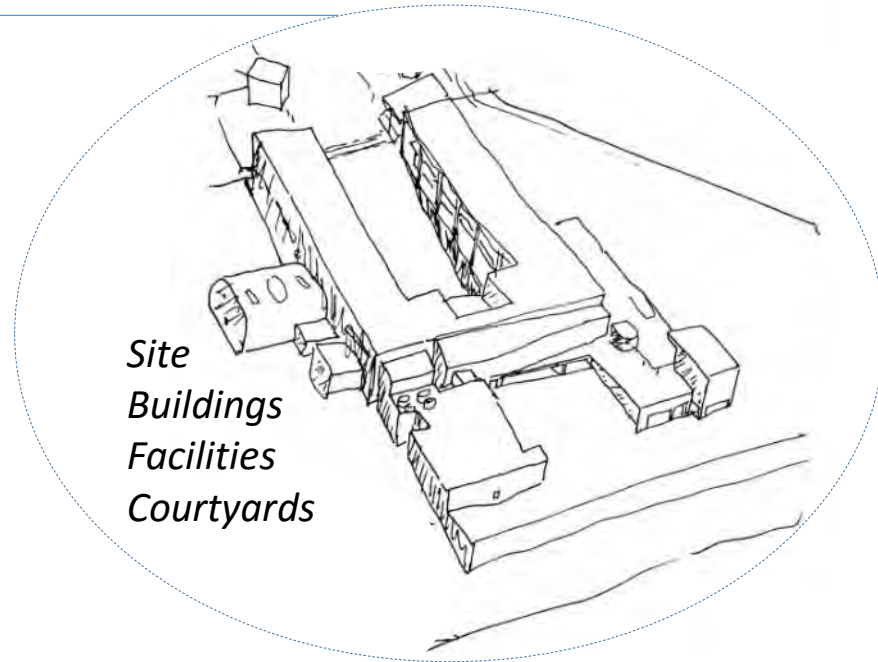


Global Alliance for Disaster Risk Reduction and Resilience in the Education Sector (GADRRRES)

The components of the physical environment



PHYSICAL ENVIRONMENT



CONCERNS OF DECISION-MAKERS

WHAT IS THE ACTUAL SAFETY SITUATION?

WHICH SCHOOL SHOULD BE PRIORITIZED?

WHY?

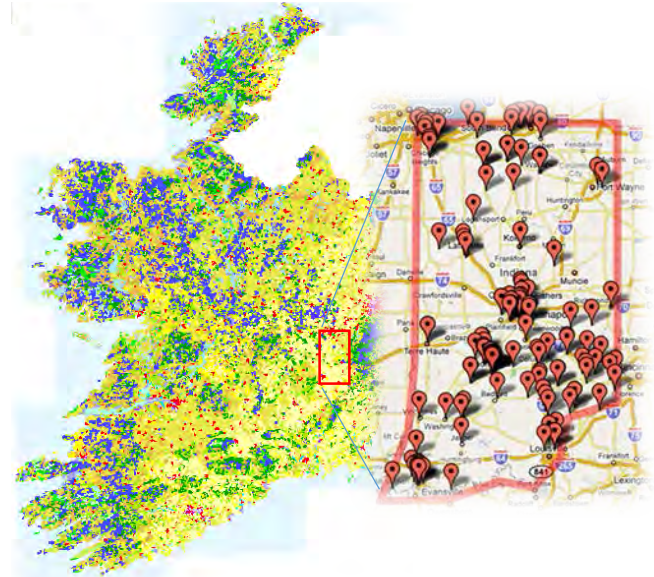
WHAT INTERVENTIONS ARE NECESSARY?

HOW MUCH WOULD RETROFITTING COST?

HOW MANY INTERVENTIONS ARE FEASIBLE
GIVE THE AVAILABLE RESOURCES?

HOW SHOULD WE COMMUNICATE
THE RISK LEVEL TO THE COMMUNITY?

AT REGIONAL LEVEL

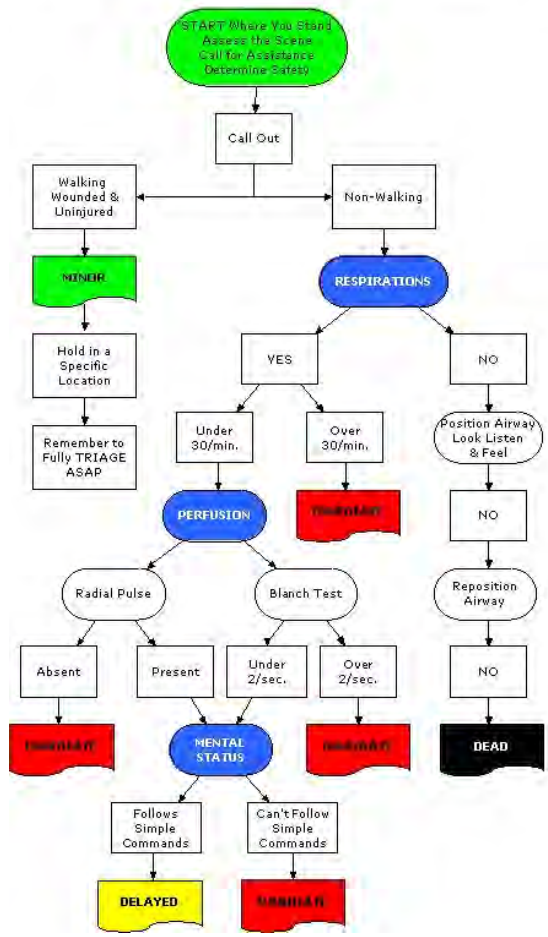


PRIORITIZATION OF THE TREATMENTS FOR A COST-EFFECTIVE RESOURCES ALLOCATION

MEDICAL SUPPORT IN DISASTER

PLANNING

START - Simple Triage And Rapid Treatment



<http://mymedicaldiary.blogspot.it>

TRIAGE FOR RAPID MEDICAL TREATMENT



PRAGMATIC CHARACTERIZATION AND EVALUATION

TRIAGE FOR SAFETY UPGRADING

PRAGMATIC CHARACTERIZATION AND EVALUATION

PATIENTS



BUILDINGS



TREATMENTS

INTERVENTION NEEDS

PRIORITY CONVENIENCE

PRIORITY CONVENIENCE

START TRIAGE

DISASTER RESPONSE TRIAGE TAG

NO OF WALKING CASUALTIES (ESTIMATED)

NO OF WALKING CASUALTIES (CONFIRMED)

PRIORITY 0 DECEASED/EXPECTANT

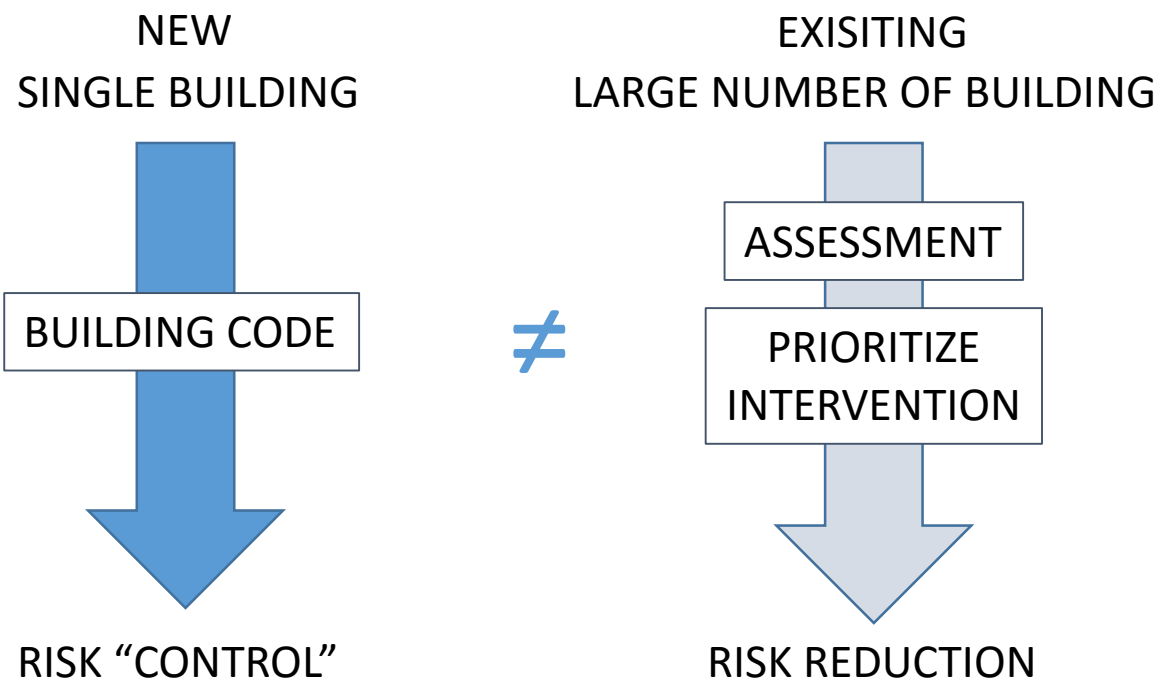
PRIORITY 1 IMMEDIATE

PRIORITY 2 DELAYED

PRIORITY 3 MINOR INVOLVED BUT NO APPARENT INJURIES

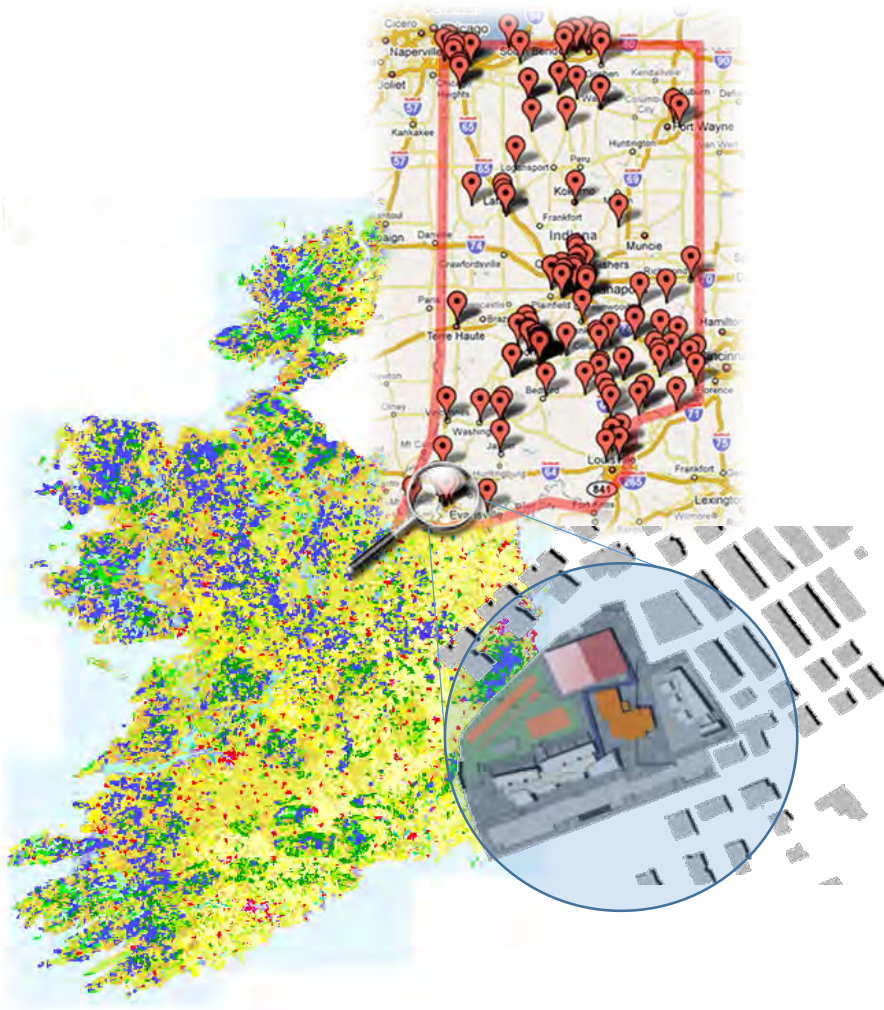
<http://www.mcitrailers.com>

TWO DIFFERENT PROBLEMS



CAN WE TRANSFER "TOUT COURT" THE APPROACHES?

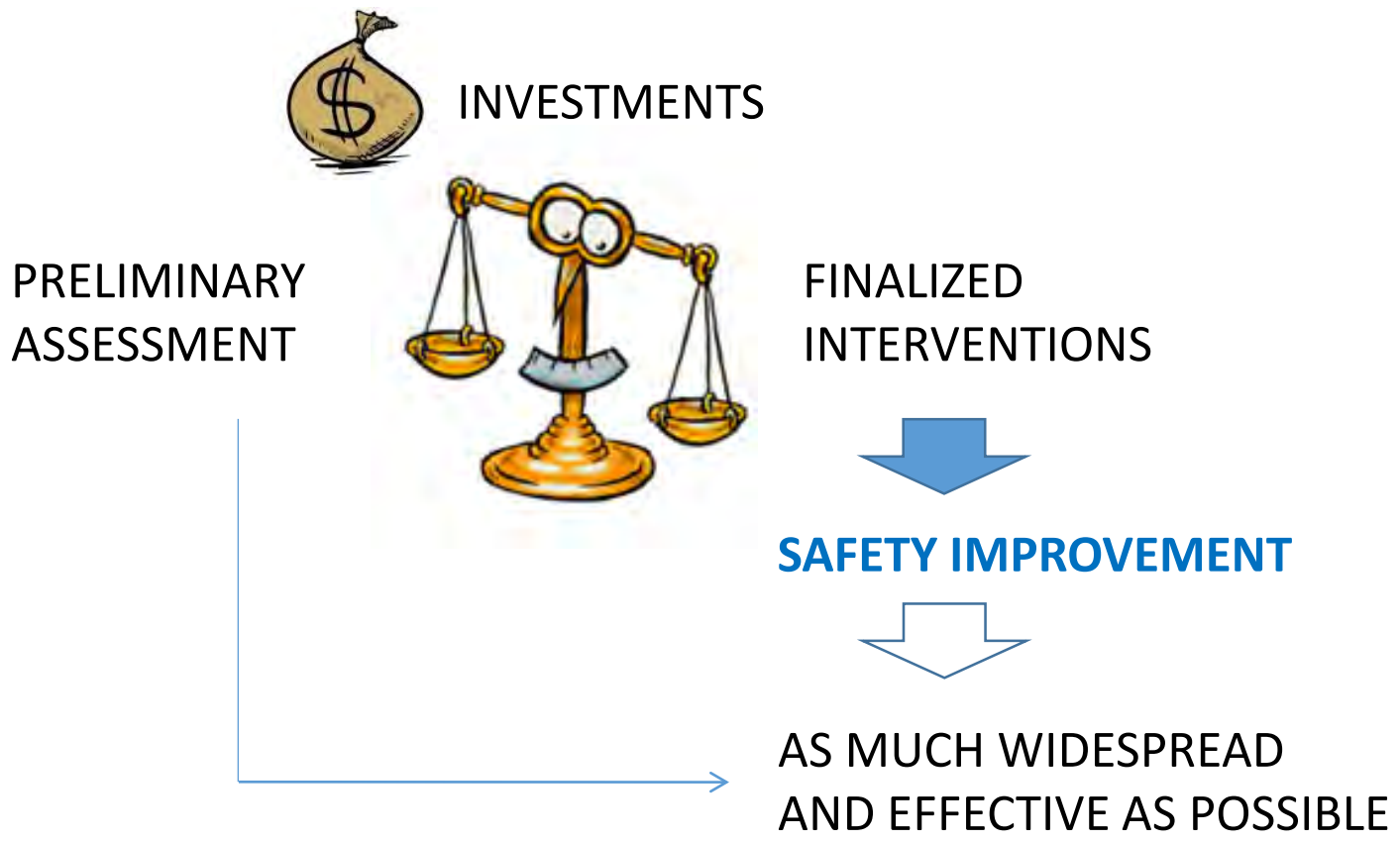




HOW MANAGE THE ASSESSMENT FOR DEFINING A COST-EFFECTIVE SAFETY UPGRADING STRATEGY?

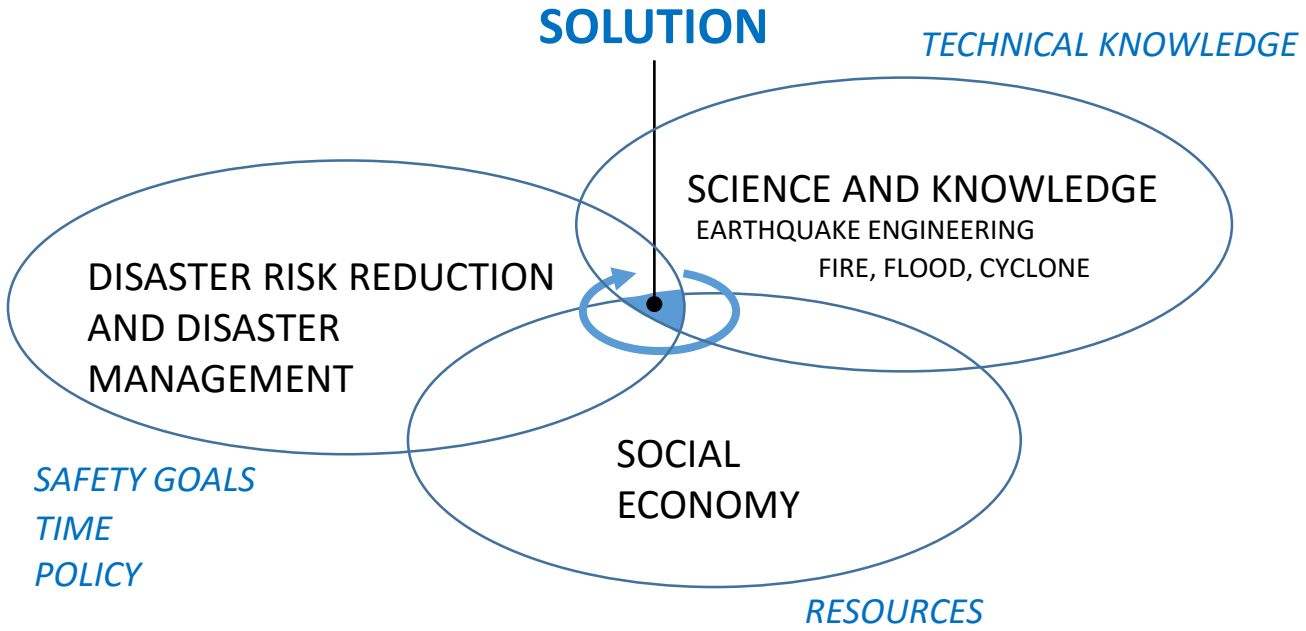


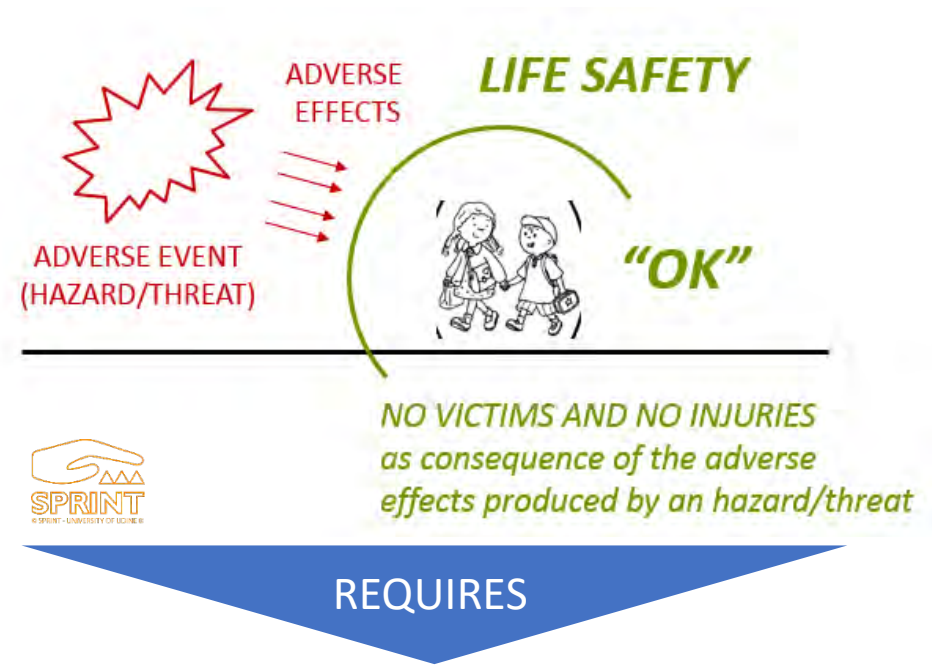
ASSESSMENT CRITERIA SHOULD BE UNIFORM AND COMPARABLE THUS FACILITATING THE PLANNING OF INTERVENTION STRATEGIES ON A LARGE NUMBER OF SCHOOLS



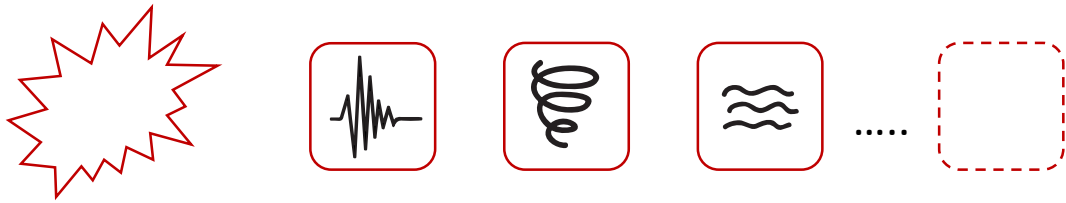
HOW TO ASSESS, AND “HOW MUCH IS ENOUGH” TO KNOW FOR DEFINING WHAT TO DO?

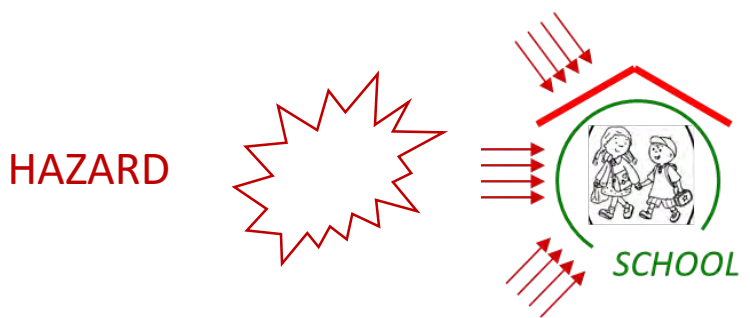






MULTI-HAZARD ASSESSMENT





EARTHQUAKES 

WINDSTORMS 

FLOODS 

FIRE 

ORDINARY USE 





EARTHQUAKES



WINDSTORMS





FLOOD



OTHERS



TSUNAMI



LANDSLIDES



FIRE



R#31



R#32

What to evaluate? Main issues?

SEISMIC SAFETY

L'Aquila (Central Italy) 06/04/2009 03.32, Mw=6.3



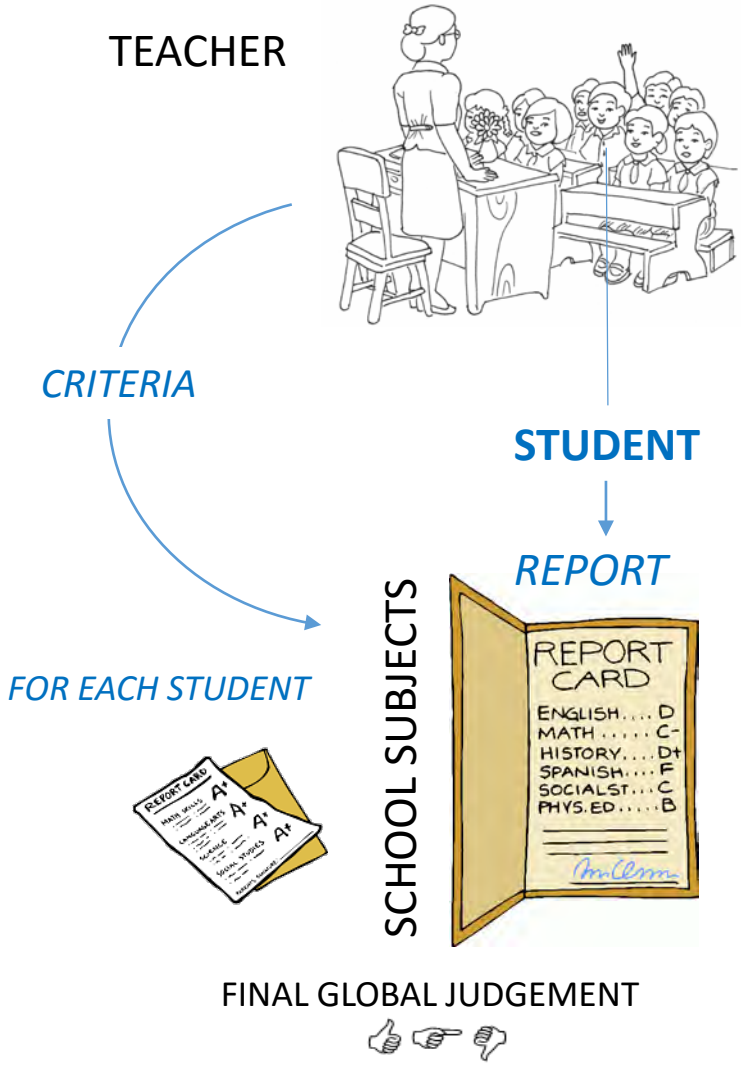
R#33

INDONESIA - ITB database

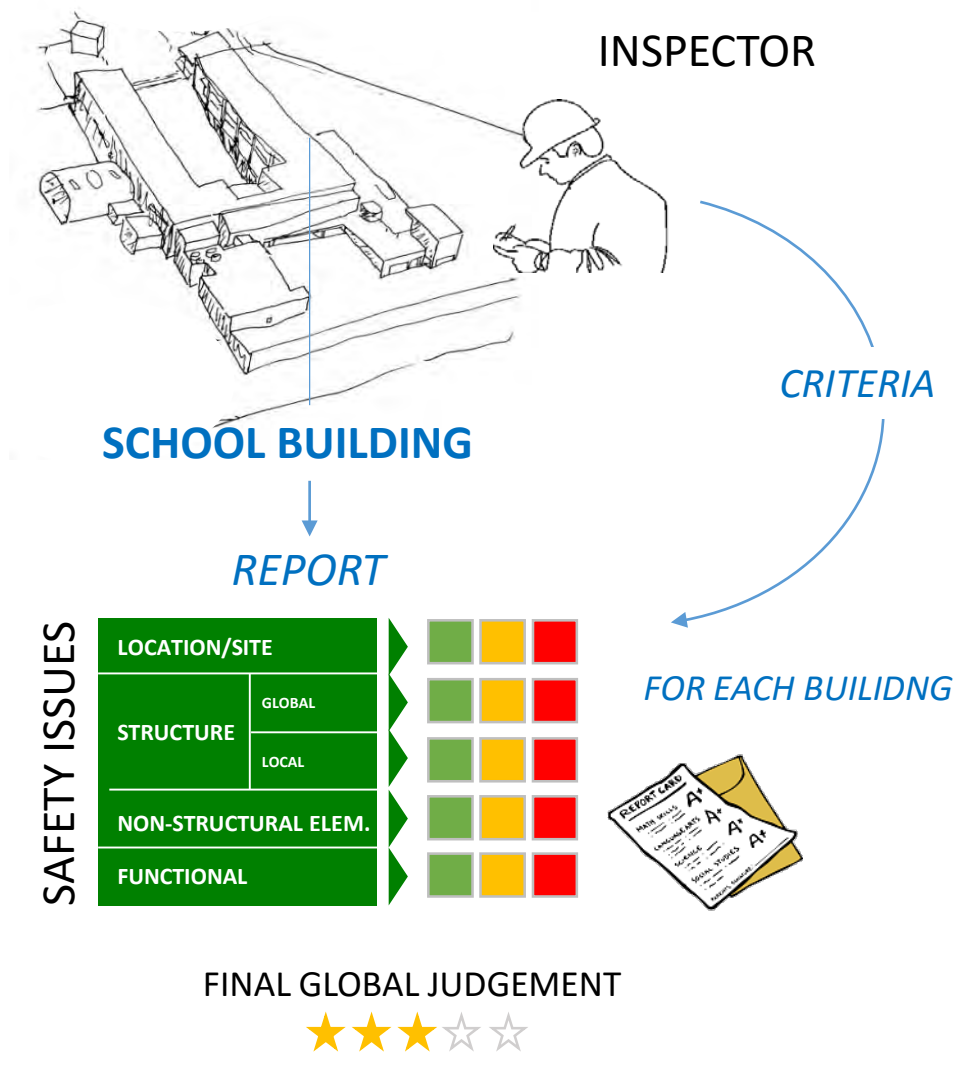
School collapse after earthquake



CLASS



SCHOOL COMPLEX





INPUT

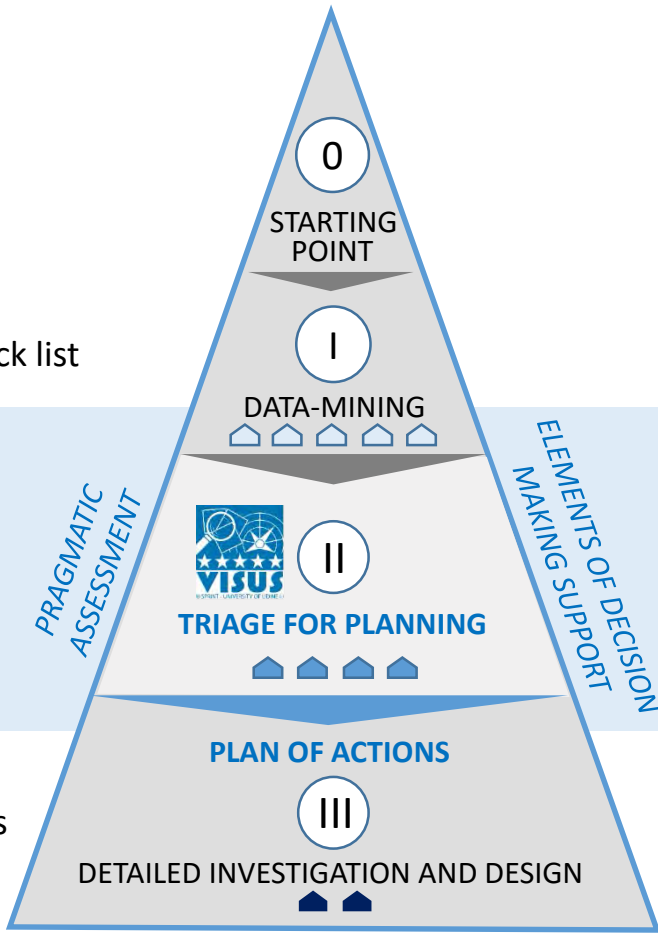
data-approach

- Desk analysis of available documentation
- Collection data
- Questionnaire/form/check list

- Visual inspection by trained surveyors

- Detailed data acquisition and quantitative analyses

Level of knowledge



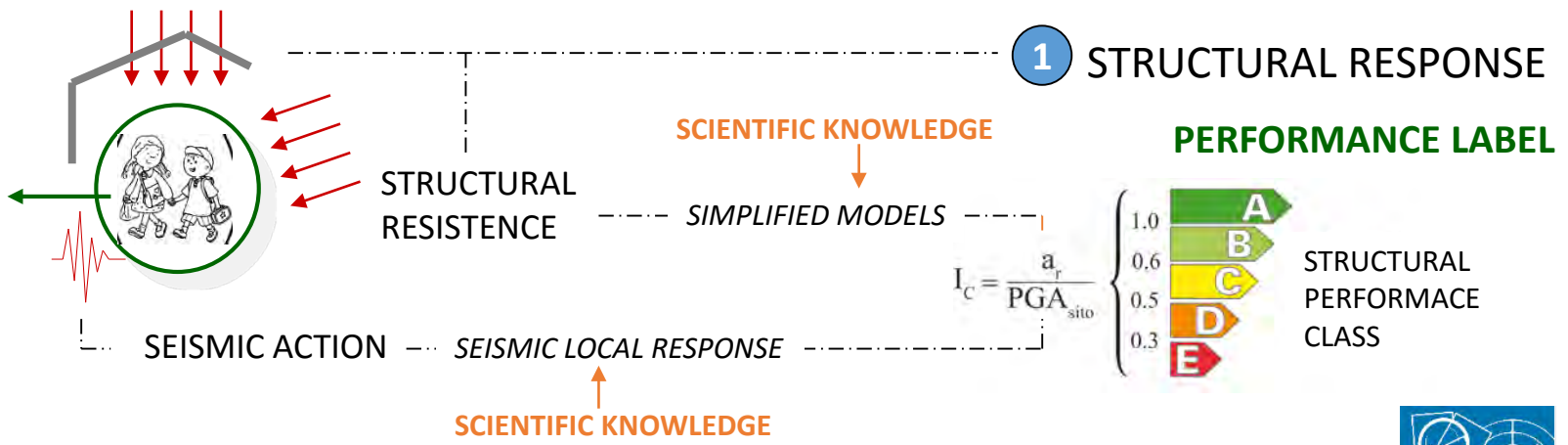
OUTPUT

decision making information

- Preliminary classification
- Class or index of risk
- Priority ranking for deepening/intervention
- Safety-weaknesses characterization
- Intervention-needs identification
- Budget allocation estimation
- Decision support for multicriteria definition of intervention strategies
- In-depth/specific assessment
- Safety design
- Detailed cost quantification

INTERVENTION

HOW



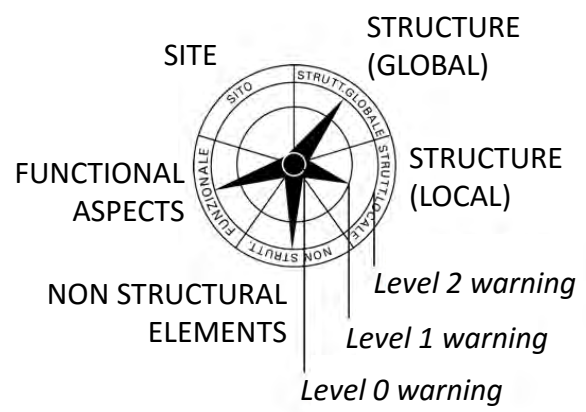
2 WEAKNESSES AND INTERVENTION NEEDS

SCIENTIFIC KNOWLEDGE

VISUAL METHODOLOGY



ROSE OF WARNINGS AND 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





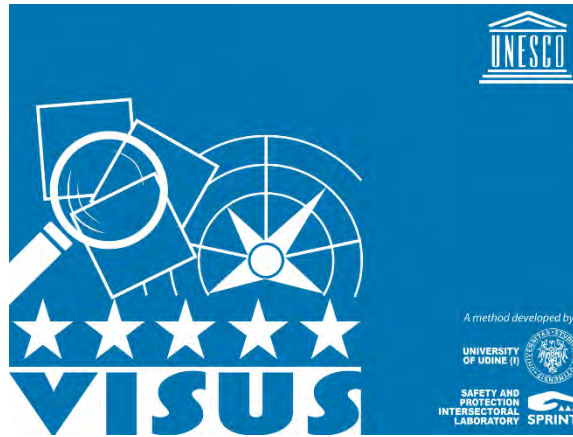
3 GLOBAL SAFETY-INDICATOR (PERFORMANCE BASED)



GLOBAL JUDGEMENT ON SCHOOL FACILITIES SAFETY

Criteria for the progressive assignment of the safety stars (scenario-dependent)

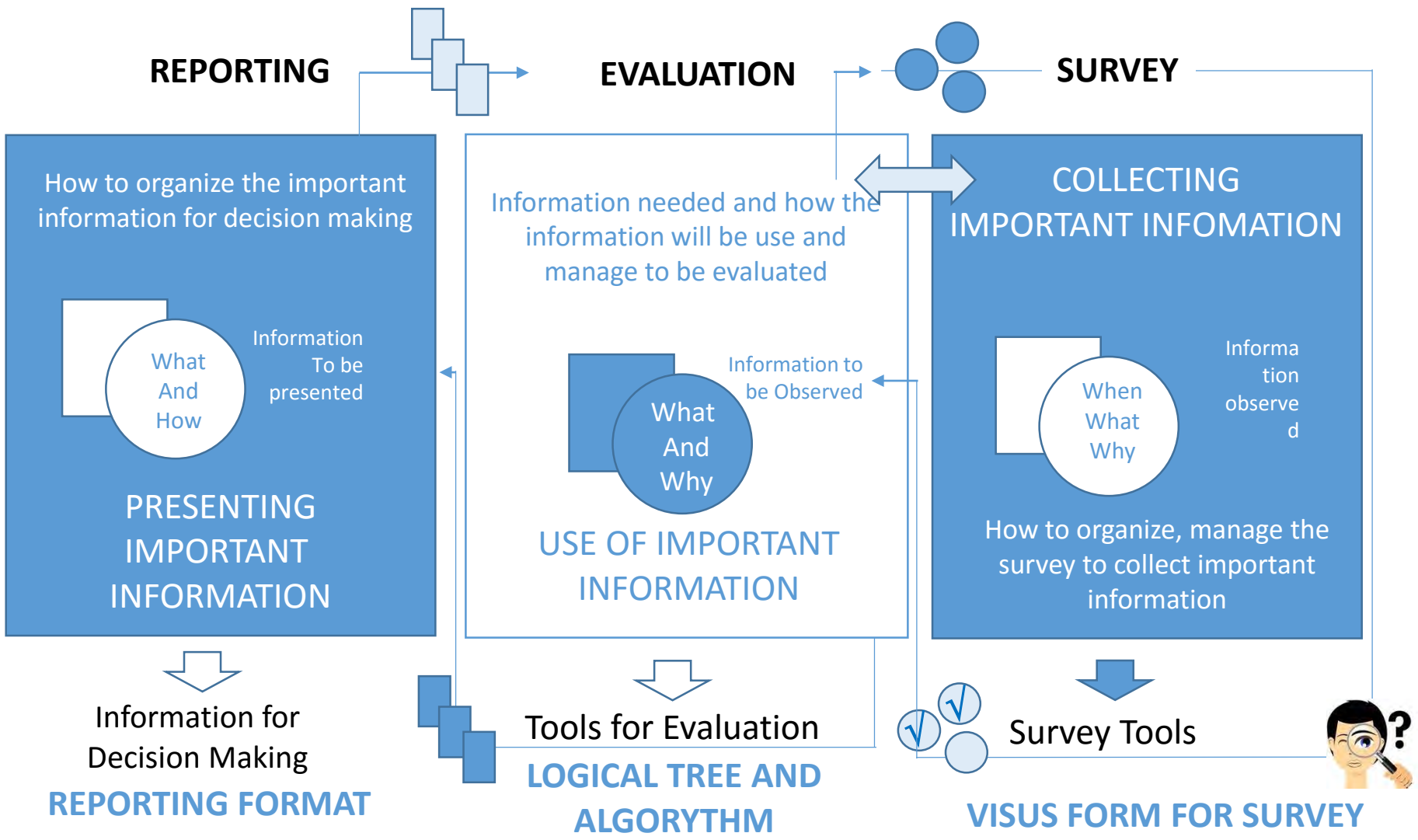
- ☆☆☆☆☆
(Level 2 of concern for site)
Unsuitable site
- ★☆☆☆☆
(absence of Level 2 of concern for site)
Suitable site
- ★★☆☆☆
(absence of Level 2 of concern for structural global)
Stability of the building
- ★★★☆☆
(absence of Level 2 of concern for all issues)
Life safeguard
- ★★★★☆
(absence of Level 1 of concern for structural global and local)
Rapid resume of operations
- ★★★★★
(absence of Level 1 of concern for all issues)
Immediately operational

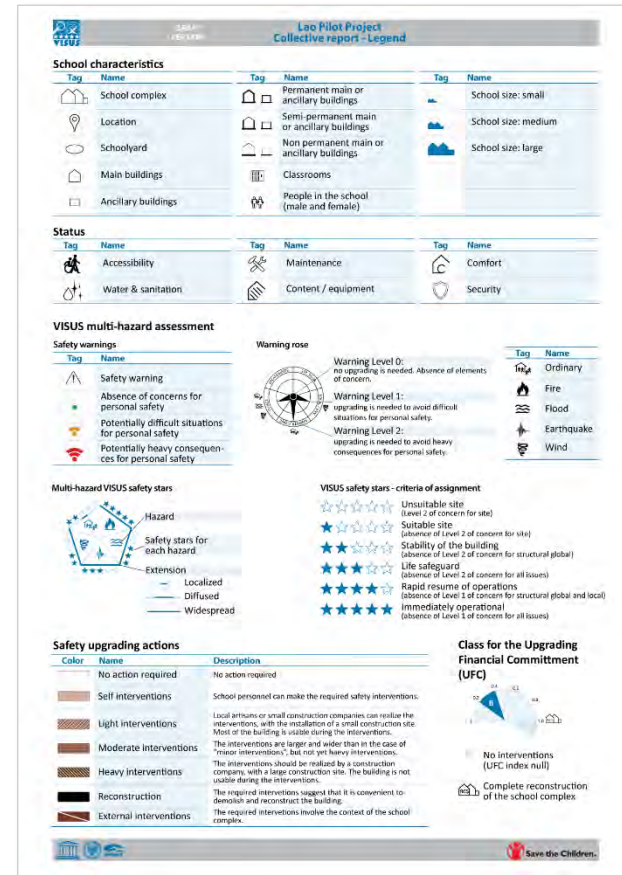
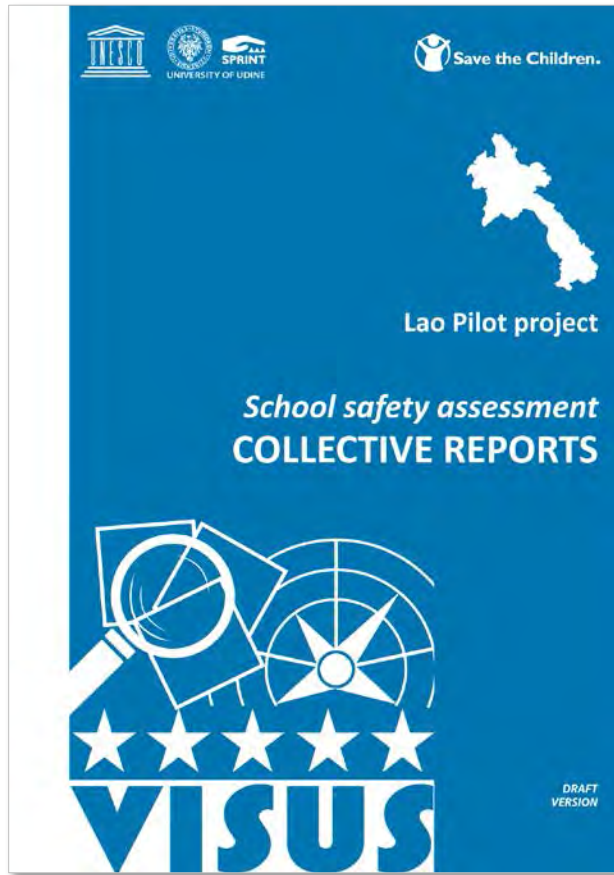


PROTOTYPE

FIRST
EXPERIMENTAL
APPLICATION







IDENTIFICATION

DECIPTION

STATUS

VISUS MULTIHAZARD ASSESSMENT INDICATORS

VISUS SUGGESTED ACTIONS

RESOURCES

<p>LA 0011 1106 001</p> <p>Namkang primary school</p> <p>Bolikhamxai, Viengthong</p> <p>Namkang village</p> <p><input type="checkbox"/> PRIMARY</p> <p><input type="checkbox"/> SECONDARY</p>	<p>SCHOOLYARD AREA 20,000 m²</p> <p>MAIN BUILDINGS 3 1 2 976 m²</p> <p>ANCILLARY BUILDINGS 3 1 1 246 m²</p> <p>CLASSROOMS 15 SIZE</p> <p>PEOPLE IN THE SCHOOL 685</p>	<p><input type="checkbox"/> NOT ACCESSIBLE</p> <p><input type="checkbox"/> POOR</p> <p><input type="checkbox"/> POOR</p> <p><input type="checkbox"/> MINIMAL</p> <p><input type="checkbox"/> POOR</p> <p><input type="checkbox"/> PARTIALLY FENCED</p>	<p><input type="checkbox"/> LOCATION</p> <p><input type="checkbox"/> SCHOOLYARD</p> <p><input type="checkbox"/> MAIN BUILDINGS</p> <p><input type="checkbox"/> ANCILLARY BUILDINGS</p>		<p><input type="checkbox"/> NO ACTIONS</p> <p><input type="checkbox"/> LOCALIZED</p> <p><input type="checkbox"/> MODERATE INTERVENTIONS</p> <p><input type="checkbox"/> SELF INTERVENTIONS</p> <p><input type="checkbox"/> HEAVY INTERVENTIONS</p> <p><input type="checkbox"/> MINOR INTERVENTIONS</p> <p><input type="checkbox"/> RECONSTRUCTION</p>	<p>UPGRADING FINANCIAL COMMITMENT</p> <p>INDEX: 0.33</p> <p>CLASS: B</p> <p>ESTIMATED RANGE: 89-109 K\$</p>
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 Jair Torres - UNESCO HQ

School complex

Location and schoolyard and photo reportage

School building and photo reportage

DRAFT VERSION SMP NASIONAL

20219502

IDENTIFICATION
SMP NASIONAL

Country: Indonesia
Province: DKI Jakarta WEST JAVA
Address: Saling serang street, no. 17, sekeloa, coblong, bandung, 40134

LOCATION
Coordinates: 6°56'45.41" S, 107°50'00.00" E

CONTEXT
SCHOOLYARD AND SCHOOL BUILDINGS

EDUCATIONAL TYPOLOGY
OWNER: SMP NASIONAL
USAGE: EDUCATIONAL

MULTI-HAZARD EVALUATIONS
VISUS SAFETY INDICATORS - FOR REFERENCE HAZARDS

20219502 p.1

DRAFT VERSION SMP NASIONAL

20219502

LOCATION & SCHOOLYARD

LOCATION
TOPOGRAPHY
CONTEXT

SCHOOLYARD
FENCES / ACCESS
SAFE AREAS

VISUS SAFETY INDICATORS - WARNING BOSES AND SAFETY STARS
FIRE, FLOOD, EARTHQUAKE, WIND

PROFILE FOR LOCATION AND SCHOOLYARD

20219502 p.2

DRAFT VERSION SMP NASIONAL

20219502

B01

BUILDING LEVEL
GEOMETRY AND DIMENSIONS
VERTICAL STRUCTURAL MATERIAL AND SYSTEM

VISUS SAFETY INDICATORS - WARNING BOSES AND SAFETY STARS
FIRE, FLOOD, EARTHQUAKE, WIND

COMPLEMENTARY EVALUATIONS
ACCESSIBILITY, MAINTENANCE, COMFORT, SECURITY

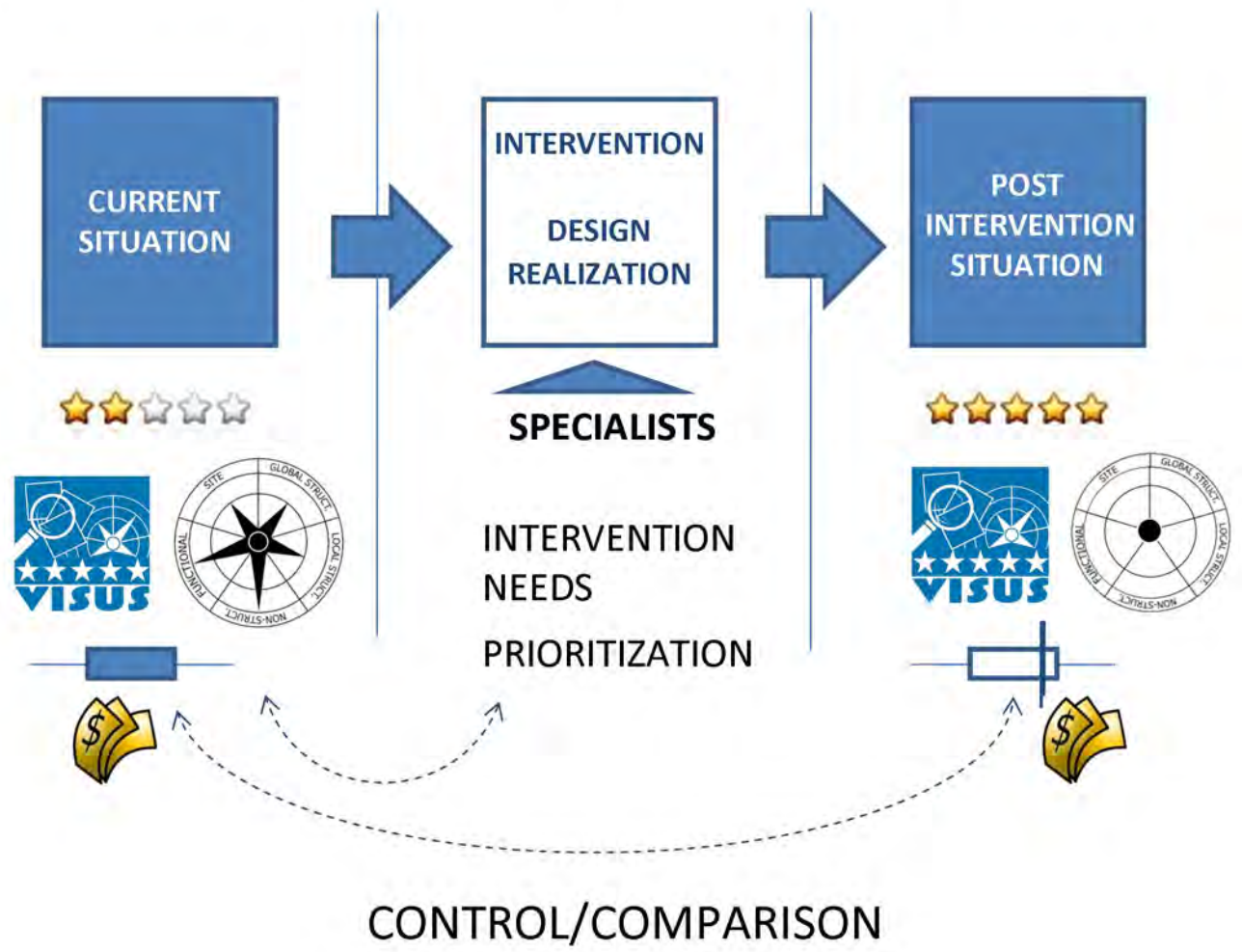
20219502 p.3

ID	SCHOOL CHARACTERISTICS	STATUS	VISUS MULTI-HAZARD ASSESSMENT	SAFETY UPGRADING ACTIONS	BUDGET ALLOCATION
ID 20211XXX 3005 KAPA '00 BENDU Jawa Barat Jl. Raya Cigugur 40.449 PRIMARY SCHOOL	SCHOOL CHARACTERISTICS SCHOOLYARD AREA: 1725 m ² MAIN BUILDINGS: 1 0 0 600 m ² ANCILLARY BUILDINGS: 1 1 1 75 m ² CLASSROOMS: 6 SIZE PEOPLE IN THE SCHOOL: 98	STATUS NOT ACCESSIBLE POOR BASIC BASIC POOR UNCONTROLLED OR UNLIMITED ACCESS	VISUS MULTI-HAZARD ASSESSMENT LOCATION SCHOOLYARD MAIN BUILDINGS ANCILLARY BUILDINGS 2 5 stars	SAFETY UPGRADING ACTIONS NO ACTIONS REQUIRED LIGHT INTERVENTIONS 600 75 100% BUILDINGS AREA 1 0 0 1 1 1 100% UPGRADED SITUATION LEGEND: NO ACTIONS REQUIRED, LIGHT INTERVENTIONS, EXTERNAL INTERVENTIONS	BUDGET ALLOCATION UPGRADING FINANCIAL COMMITMENT INDEX: 0.48 CLASS: C ESTIMATED RANGE: 54-66 K\$
ID 20219XXX SMPN 010 BANGUNG Java Barat Jl. Sekeloa-keloa (Bangung Bandung), Kode Pos: 40134 VOCATIONAL	SCHOOL CHARACTERISTICS SCHOOLYARD AREA: 43000 m ² MAIN BUILDINGS: 20 0 0 27832 m ² ANCILLARY BUILDINGS: 0 0 0 0 m ² CLASSROOMS: 94 SIZE PEOPLE IN THE SCHOOL: 2534	STATUS NOT ACCESSIBLE POOR GOOD BASIC POOR CONTROLLED ACCESS	VISUS MULTI-HAZARD ASSESSMENT LOCATION SCHOOLYARD MAIN BUILDINGS ANCILLARY BUILDINGS 2 5 stars	SAFETY UPGRADING ACTIONS EXTERNAL INTERVENTIONS LIGHT INTERVENTIONS 13335 11496 100% BUILDINGS AREA 20 0 0 1 1 1 100% UPGRADED SITUATION LEGEND: EXTERNAL INTERVENTIONS, LIGHT INTERVENTIONS, NO ACTIONS REQUIRED	BUDGET ALLOCATION UPGRADING FINANCIAL COMMITMENT INDEX: 0.46 CLASS: C ESTIMATED RANGE: 2003-2448 K\$
ID 20219XXX SMPN 010 BANGUNG Java Barat Gedung sekeloa keloa no. 17, Sekeloa keloa Bandung, 40134 UPPER SECONDARY SCHOOL	SCHOOL CHARACTERISTICS SCHOOLYARD AREA: 11297 m ² MAIN BUILDINGS: 3 0 0 3387 m ² ANCILLARY BUILDINGS: 0 0 0 150 m ² CLASSROOMS: 34 SIZE PEOPLE IN THE SCHOOL: 1449	STATUS NOT ACCESSIBLE POOR GOOD BASIC BASIC LIMITED ACCESS	VISUS MULTI-HAZARD ASSESSMENT LOCATION SCHOOLYARD MAIN BUILDINGS ANCILLARY BUILDINGS 3 5 stars	SAFETY UPGRADING ACTIONS NO ACTIONS REQUIRED NO ACTIONS REQUIRED 528 2859 150 100% BUILDINGS AREA 3 0 0 1 1 1 100% UPGRADED SITUATION LEGEND: NO ACTIONS REQUIRED, EXTERNAL INTERVENTIONS, LIGHT INTERVENTIONS	BUDGET ALLOCATION UPGRADING FINANCIAL COMMITMENT INDEX: 0.21 CLASS: B ESTIMATED RANGE: 116-142 K\$
ID 20219XXX SMPN 01140 BANGUNG Java Barat Jl. Sekeloa Keloa, Bandung MIDDLE SCHOOL	SCHOOL CHARACTERISTICS SCHOOLYARD AREA: 5000 m ² MAIN BUILDINGS: 4 0 0 3700 m ² ANCILLARY BUILDINGS: 0 0 0 100 m ² CLASSROOMS: 23 SIZE PEOPLE IN THE SCHOOL: 1288	STATUS NOT ACCESSIBLE POOR GOOD BASIC BASIC CONTROLLED ACCESS	VISUS MULTI-HAZARD ASSESSMENT LOCATION SCHOOLYARD MAIN BUILDINGS ANCILLARY BUILDINGS 1 5 stars	SAFETY UPGRADING ACTIONS NO ACTIONS REQUIRED NO ACTIONS REQUIRED 3007 700 100 100% BUILDINGS AREA 4 0 0 1 1 1 100% UPGRADED SITUATION LEGEND: EXTERNAL INTERVENTIONS, LIGHT INTERVENTIONS, NO ACTIONS REQUIRED	BUDGET ALLOCATION UPGRADING FINANCIAL COMMITMENT INDEX: 0.68 CLASS: D ESTIMATED RANGE: 404-494 K\$
ID 20219XXX SMPN 0101401 West Java Gedung sekeloa keloa no. 17, Sekeloa keloa Bandung, 40134 MIDDLE SCHOOL	SCHOOL CHARACTERISTICS SCHOOLYARD AREA: 3000 m ² MAIN BUILDINGS: 2 0 0 1274 m ² ANCILLARY BUILDINGS: 0 0 0 8 m ² CLASSROOMS: 11 SIZE PEOPLE IN THE SCHOOL: 653	STATUS NOT ACCESSIBLE POOR GOOD BASIC POOR CONTROLLED ACCESS	VISUS MULTI-HAZARD ASSESSMENT LOCATION SCHOOLYARD MAIN BUILDINGS ANCILLARY BUILDINGS 2 5 stars	SAFETY UPGRADING ACTIONS EXTERNAL INTERVENTIONS LIGHT INTERVENTIONS 1274 8 100% BUILDINGS AREA 2 0 0 1 1 1 100% UPGRADED SITUATION LEGEND: EXTERNAL INTERVENTIONS, LIGHT INTERVENTIONS, NO ACTIONS REQUIRED	BUDGET ALLOCATION UPGRADING FINANCIAL COMMITMENT INDEX: 0.52 CLASS: C ESTIMATED RANGE: 104-127 K\$

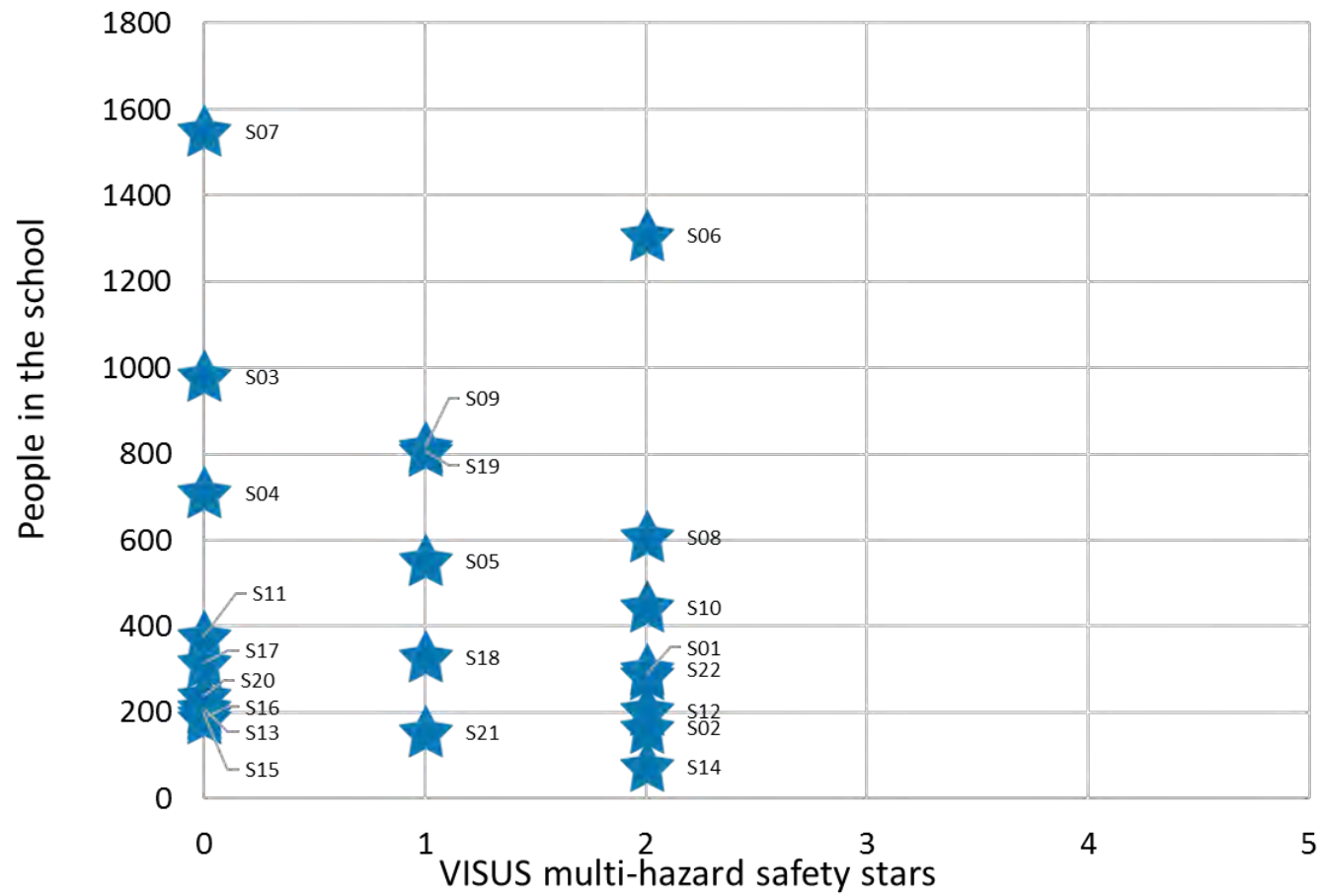
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 Jair Torres - UNESCO HQ



VISUS: A TOOL FOR INDIVIDUATING, MANAGING AND CONTROLLING THE PROCESS OF ACTIONS OF RISK MITIGATION

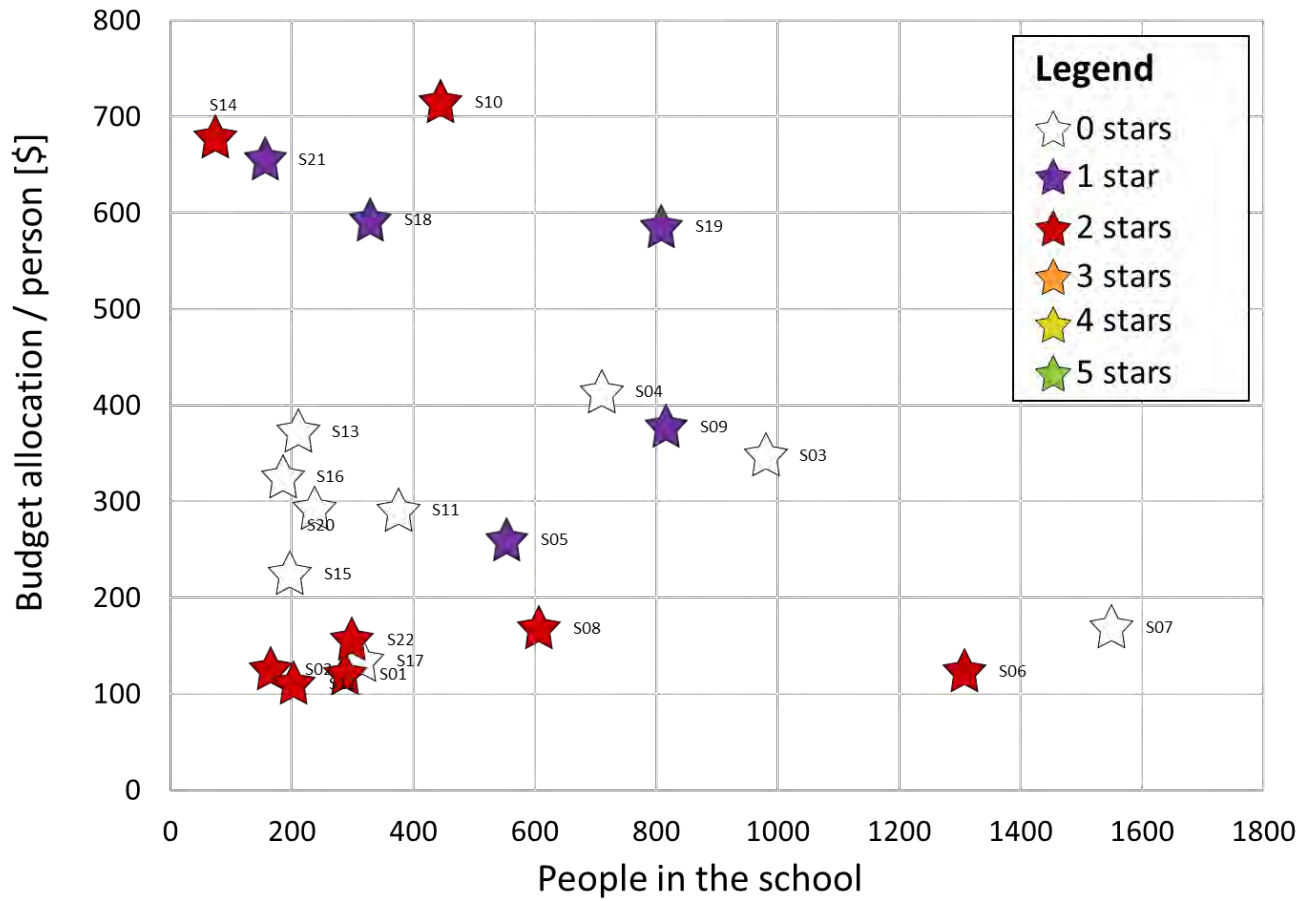


School Population compared to the Multi-Hazard Safety Stars



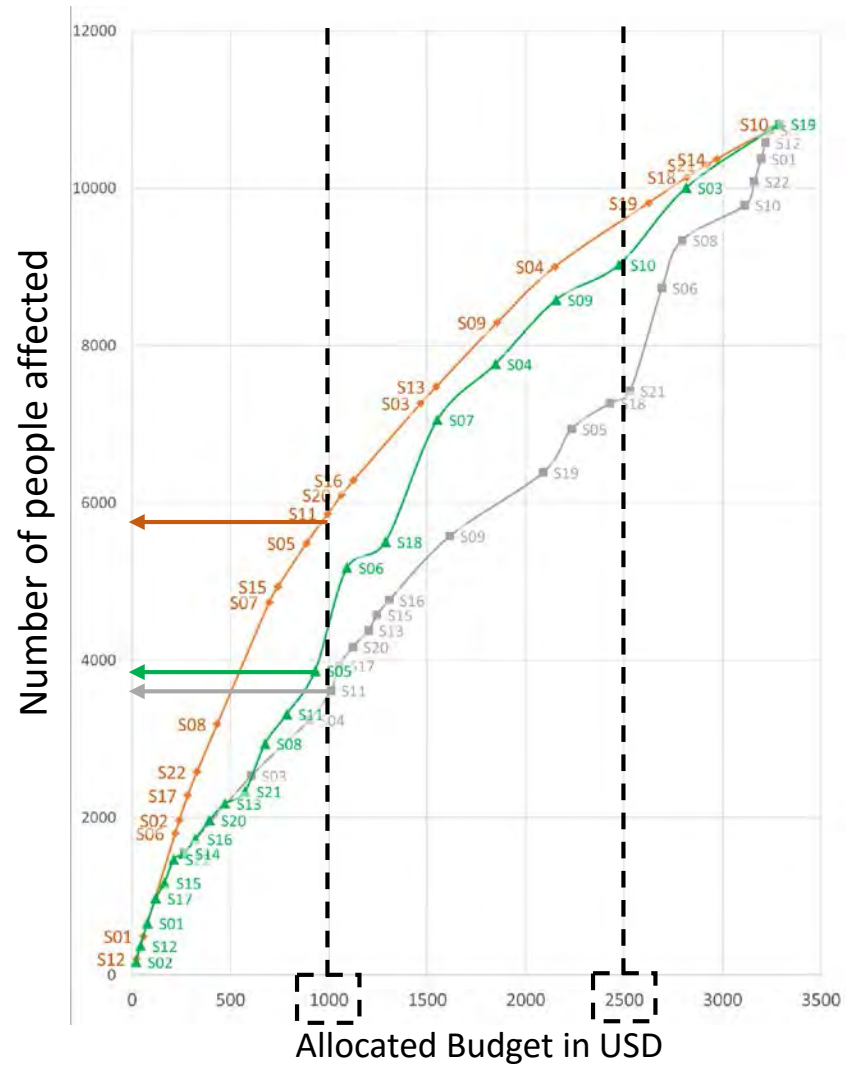
*Safety Strategy:
Intervention to Schools with Safety Stars Lower than Three*







Budget Allocation per individual compared to number of population and the multi-hazard safety stars



Effectiveness Strategy for the Ese of Budget

Priority Strategy



 Maximum number of people based on budget allocation	 Maximum number of schools based on budget allocation	 Priority of school with the lowest stars (and number of people)
<i>List</i>	<i>List</i>	<i>List</i>
<ul style="list-style-type: none"> S12 S01 S06 S02 S17 S22 S08 S07 S15 S05 S11 S20 S16 S03 S09 S04 S19 S18 S21 S14 S10 	<ul style="list-style-type: none"> S02 S12 S01 S17 S15 S22 S14 S16 S20 S13 S21 S08 S11 S05 S06 S18 S07 S04 S09 S10 S03 S19 	<ul style="list-style-type: none"> S07 S03 S04 <ul style="list-style-type: none"> 1000 K\$ → S11 4 S20 S13 S15 S16 S09 S19 <ul style="list-style-type: none"> 2500 K\$ → S05 13 S18 S21 S06 S08 S10 S22 S01 S12 S02 S14
1000 K\$ 11 2500 K\$ 18	1000 K\$ 14 2500 K\$ 20	1000 K\$ 4 2500 K\$ 13
 Suggested prioritization order	 Suggested prioritization order	 Suggested prioritization order



United Nations
Educational, Scientific and
Cultural Organization

Thank You



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youtube.com/iotsunami

**For More Information:
Ardito M Kodijat**

Disaster Risk Reduction and Tsunami Information Unit - UNESCO Jakarta Office
Indian Ocean Tsunami Information Centre – UNESCO/IOC
a.kodijat@unesco.org