Contributing to a Global School infrastructure baseline

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A Roadmap for Safer Schools
January 30-31, 2017

History and timeline of School Safety focus

2009 – Global Platform for Disaster Risk Reduction, requirements to governments:

2011 - National assessments of existing education and health facilities

2015 - National action plans for safer schools and hospitals

A mapping of disaster risk reduction integration in the school curricula in 30 countries (UNESCO- UNICEF)
A global baseline study on school safety providing guidance and recommendations to Governments for school safety implementation, including successful school safety assessment methodologies in 10 countries (UNISDR)
A Comprehensive School Safety Framework developed by Save the Children in coordination with the Global Alliance for DRR and Resilience Education
A One Million Safe Schools and Hospitals Initiative that promoted a pledging system for safer schools and health infrastructures and reached 138,000 pledges. (UNISDR)

Sendai Framework

UNISDR
The United Nations Office for Disaster Risk Reduction

www.preventionweb.net/go/sfdrr
www.unisdr.org
isdr@un.org

Chart of the Sendai Framework for Disaster Risk Reduction
2015-2030

Scope and purpose

The present framework will apply to the risk of small-scale and large-scale, frequent and infrequent, sudden and slow-onset disasters, caused by natural or manmade hazards as well as related environmental, technological and biological hazards and risks. It aims to guide the multi-hazard management of disaster risk in development at all levels as well as within and across all sectors.

Expected outcome

The substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries

Goal

Prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience

Targets

- Substantially reduce global disaster mortality by 2030, aiming to lower average per 100,000 global mortality between 2020-2030 compared to 2005-2015
- Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 between 2020-2030 compared to 2005-2015
- Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030
- Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030
- Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020
- Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of this framework by 2030
- Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to people by 2030

Priorities for Action

There is a need for focused action within and across sectors by States at local, national, regional and global levels in the following four priority areas.

Priority 1
Understanding disaster risk

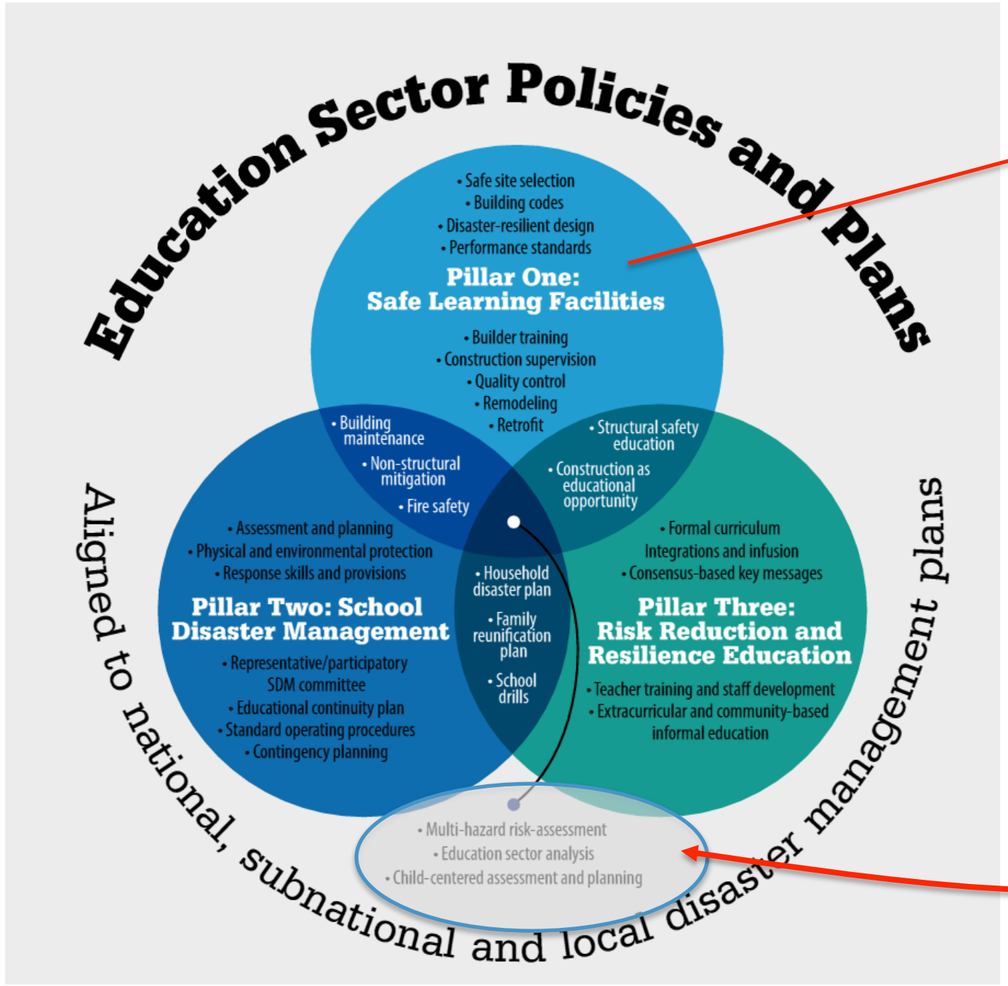
Priority 2
Strengthening disaster risk governance to manage disaster risk

Priority 3
Investing in disaster risk reduction for resilience

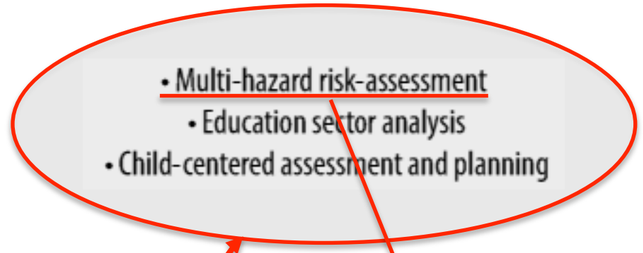
Priority 4
Enhancing disaster preparedness for effective response, and to «Build Back Better» in recovery, rehabilitation and reconstruction

Comprehensive School Safety Framework, 2017

Global Alliance for Disaster Risk Reduction and Resilience in the Education Sector and World Wide Initiative for safer Schools



Safe design for new facilities



Assessment and mitigation for existing facilities

Global Program for Safer School Facilities (GPSS)

Collaboration platform to establish a baseline for school safety

- ❑ Ensure Disaster Risk assessment for new school facilities, proportional to the expected hazards, and producing actionable recommendations
- ❑ Build communities of engineers and contractors, nationally or locally, experienced in appropriate construction techniques;
- ❑ Ensure adequate funding and establish appropriate incentives for school maintenance and repair;
- ❑ Develop a framework to better measure the benefits of safe construction;
- ❑ Support government agencies to strength their capacity to enforce the building code for the construction of public assets, in particular schools.

Peru'
Salvador
Nepal

Philippines
China

Why it makes sense investing in school infrastructure

School Buildings

Constructed prior to adequate building codes

Poor structural quality

School Children

Young age/ Vulnerable

The young generation is under great threat

Devastating to communities

Seismic Risk and Resilience Assessment and Strengthening

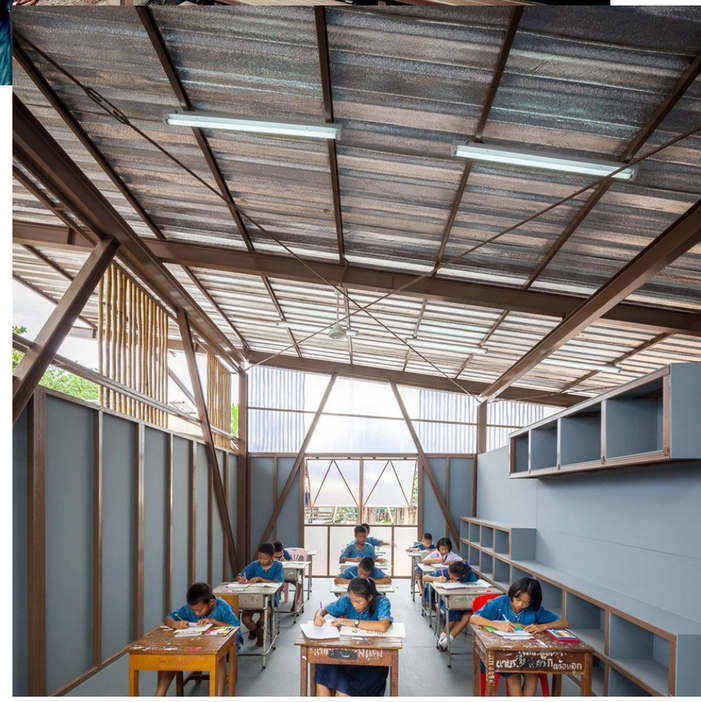
Safer School

Save vulnerable lives of children

Reduce economic loss

Bring normalcy back to society

Temporary shelter



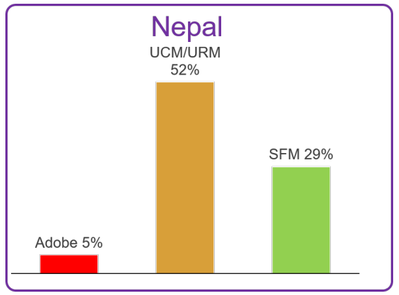
Global Baseline for Safer Schools Project

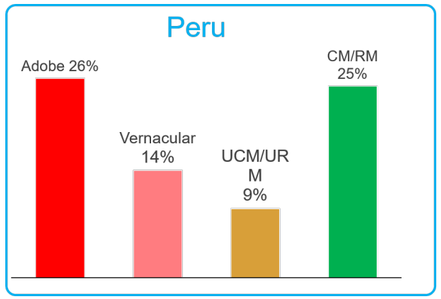
❑ Objective : Global Masonry Buildings Classification

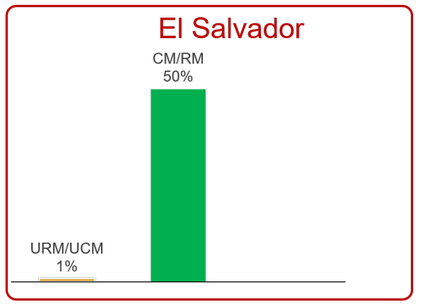
Available information on school infrastructure at national level :

Peru: National Inventory of School Buildings (~50000 schools)	⟷ National Probabilistic Seismic Risk Assessment Report 2015, Photographs
Nepal: Schools in 8 most earthquake damage affected districts (~3115 schools), can represent national level	⟷ Structural Integrity and Damage Assessment Report 2016,Arup Structural Typologies Report 2015, Photographs
El Salvador: 20% of the schools in San Salvador city (~200 schools)	⟷ Probabilistic Seismic Risk Assessment Report 2012, Photographs

GBSS project method







Review existing information at national level

Identify building types and distribution

Determines parameters affecting seismic response

Valid across typologies

Valid across countries

Classify parameters

Wall Panel Length:
SP = Short Panel,
MP = Medium Panel,
LP = Long Panel

Define global taxonomy

Wall Panel Length For URM Nepal:
SP = Short Panel 2-4 m,
MP = Medium Panel, 4-6 m
LP = Long Panel, > 6m

Identify range of existence of parameters

Determine global/ national/local index building

UCM/URM3//MR(2)//NO//FR+FF//LP//LO//CS//ND//OS//FC

Fragility & Vulnerability analysis

Vulnerability Parameters

- Building Category
- 1. Load Bearing Wall Type
- 2. Height Range (No. of Stories)
- 3. Structural Irregularity
- 4. Diaphragm Type
- 5. Wall Panel Length
- 6. Wall Openings
- 7. Foundation Type
- 8. Seismic Design Level
- 9. Seismic Retrofitting
- 10. Structural Health Condition

GBSS project output

National Typologies Identification

- Identification of construction typology at country level .
- Comparison of construction characteristics country wide.

Vulnerability Parameters

Identification of a minimum set of vulnerability attributes applicable to all the national level construction types.

Global Structural Classification

Develop a global system of classification of load bearing masonry structured school according to the vulnerability parameters

a) Up to 3 stories in height but generally single storied. The story height is generally low, varying from 1.8 m to 2.4 m.
b) Wall thickmness varying from 450 mm to 600 mm. Bond between walling units in each wythe and between wythes is poor. Through stones seldom used.In general, the external walls are constructed first and then the internal ones.
c) Generally, these buildings are rectangular plan buildings.
d) Room size (i.e. wall panels) is small and openings are fewer in number and smaller in size.
e) Floors are mud laid on wooden planks or firewood, supported by wooden joists. Roofs are light, sloped, CGI roofing supported on unbraced timber structure.
f) No proper structural connection (anchorage, ties, pegs etc.) for integrity between walls, floors or the roof

GBSS project challenges

- Disparity in country wide survey data to characterise exposure
  - Primary basic vulnerability indicator can be mapped
  - Statistical distribution are not always available
  - Secondary vulnerability qualifiers are rarely identified and quantified
  - Country wide data is collected for purposes different than structural assessment and mitigation, except in post event survey

GBSS project future developments

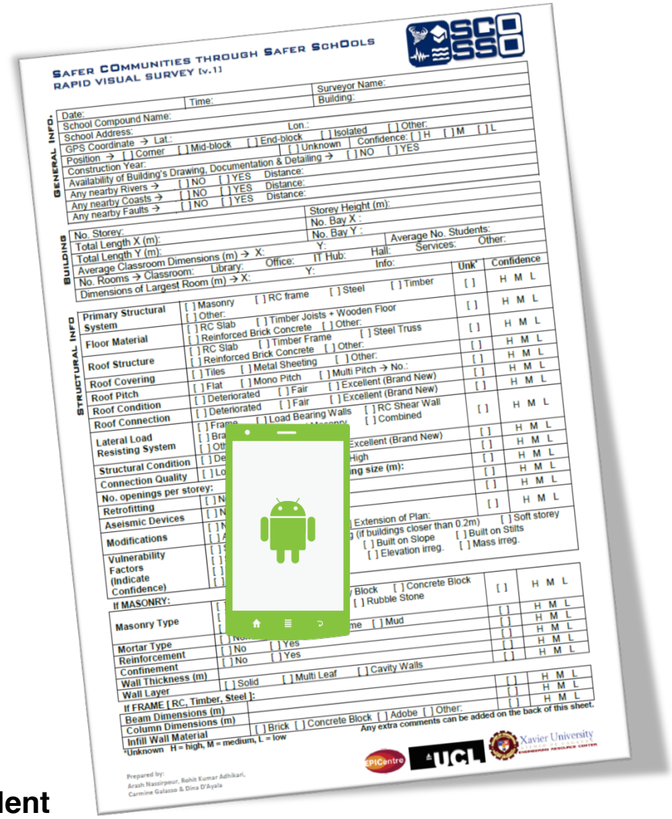
- Inventory of vulnerability function for identified building types
  - GEM Open Quake Vulnerability database
  - Consider other countries
  - Review literature for existing vulnerability functions for schools
- Define Index buildings for each typology
  - Derive typology specific vulnerability function
  - Identify strengthening strategies
  - Determine resilience improvement

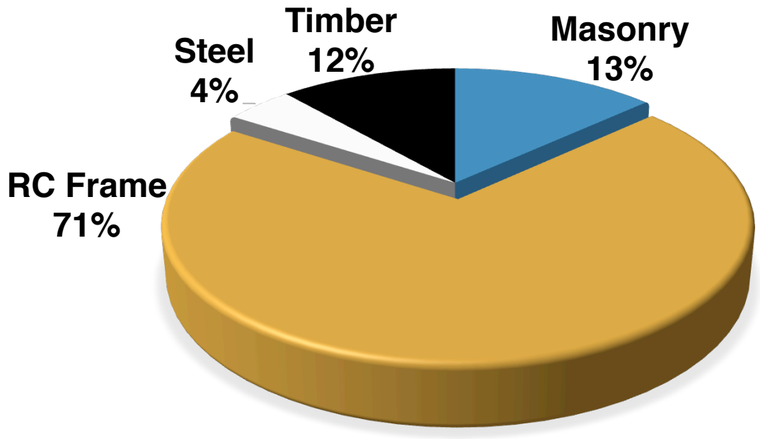
Other UCL projects on school infrastructure resilience

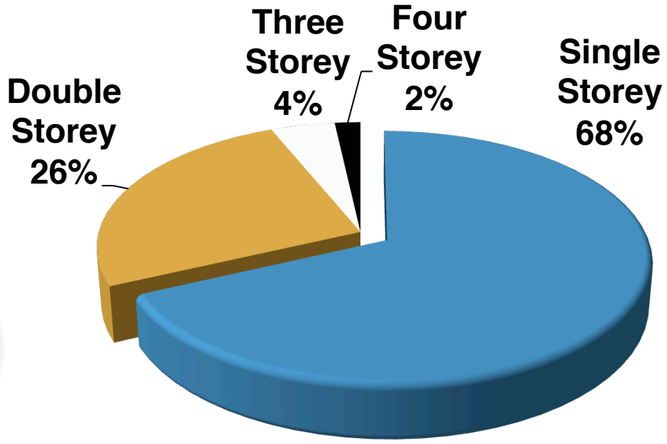
❑ SCOSSO : Safer Communities through Safer SchOols

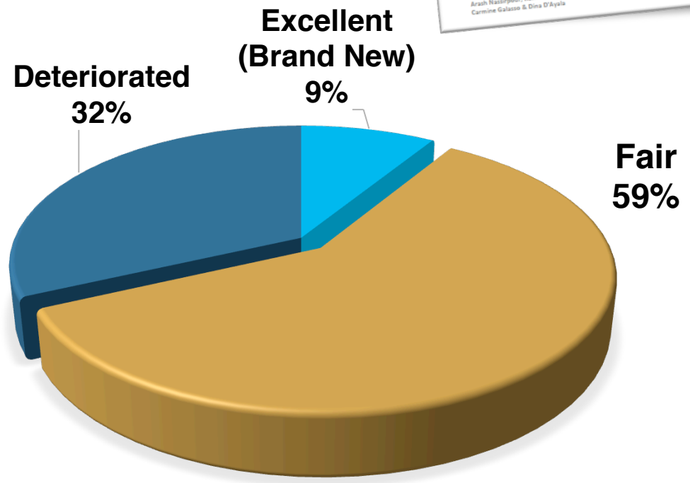
- ❑ Multi hazard

- ❑ Rapid survey:
  - ❑ Structural
  - ❑ Non structural



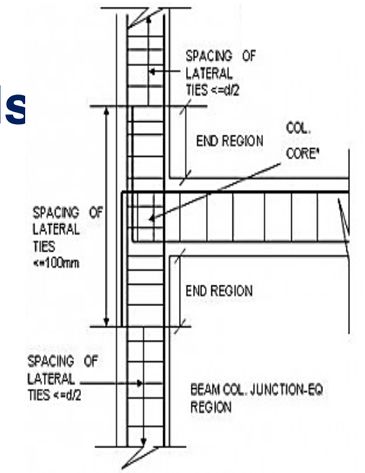


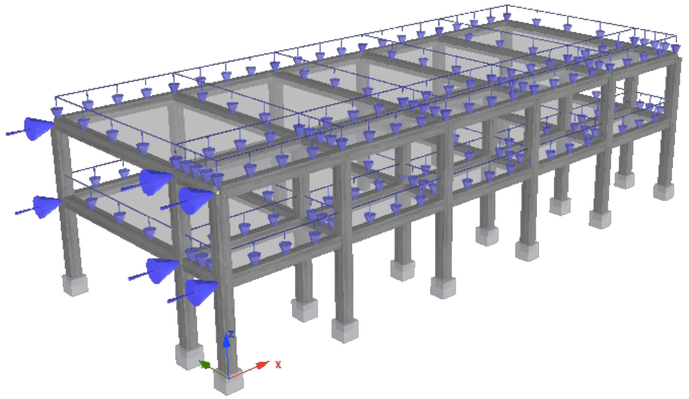


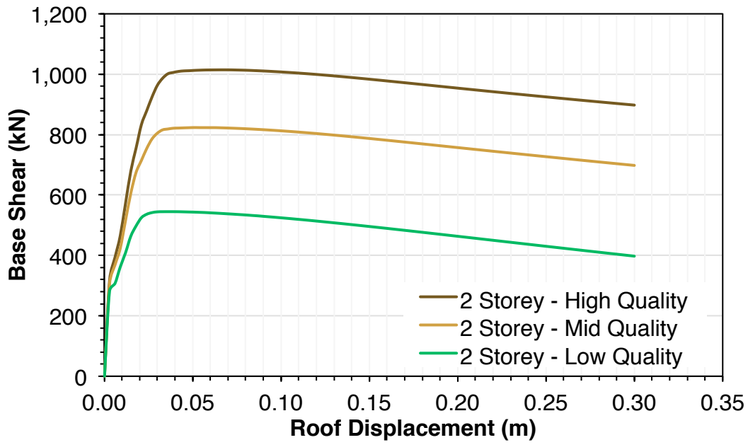


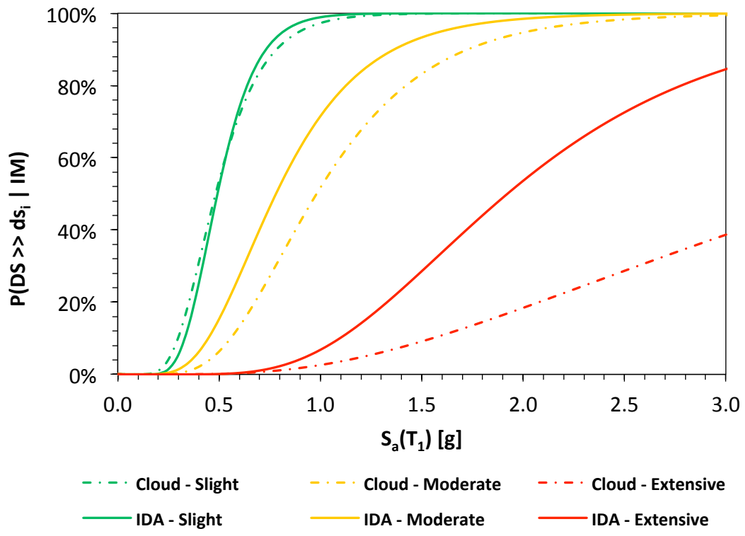
Other UCL projects on school infrastructure resilience

- **SCOSSO: Safer Communities through Safer SchOols**
  - **Detailed Survey:**
    - **Design documents and structural drawings**
    - **High Detailed numerical analysis**
    - **Derivation of fragility and vulnerability functions**







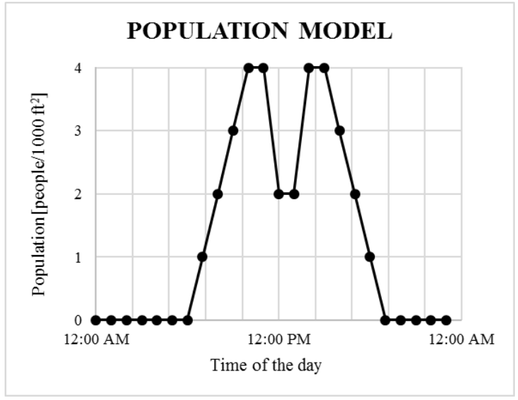


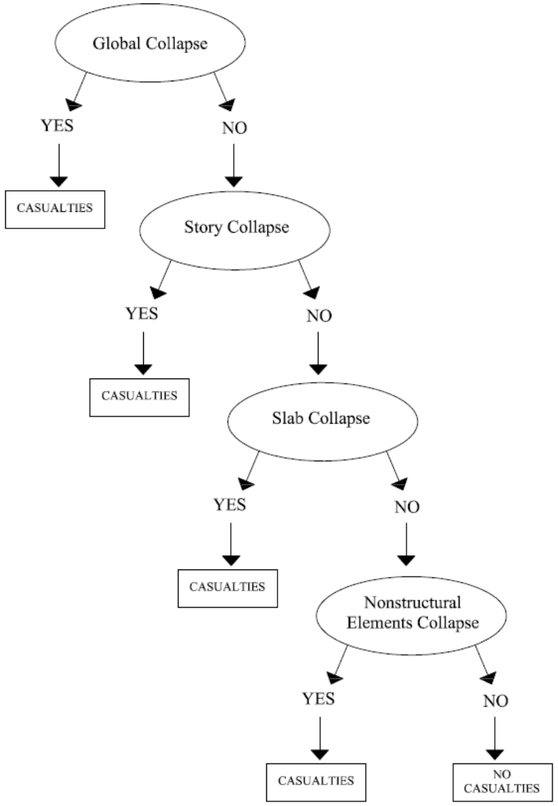
Risk	48	Value of the institution	£650'000
	49	Overall level of safety	Low
	50	Structural safety level	Low
	51	Groundwater level	+2cm
	52	Flood control activities	No
	53	Category of soil by seismic properties according to ASCE 97	E+
	54	Estimated seismicity rate of area (current)	High - Moderate
	55	Is reinforcement & retrofitting necessary	Yes
Other Risks (H, M, L)	56	Mudflow risk	High
	57	Floodwater/stream rise risk (height, flow)	Mid
	58	Risk of dam, embankments, flood gates, sluices breakage/high-altitude lake outburst	Low
	59	Avalanche risk	Low
	60	Landslide risk	High
	61	Rockfall risk	High
	62	Rockslide risk	Mid
	63	Risk of Waterlogging/rise of underground water	Low
	64	Strong wind risk (speed)	Low
	65	Long lasting precipitations risk	Mid
	66	Heavy rains, showers risk (rain with snow, sleet)	High
	67	Heavy snowfall risk	High
	68	Fire risk (mountain, steppe, corn fields)	Low
	69	Risk of accidents with emission [Radioactive substances (RS)/BioHazard/Chemically Hazard Substances (CHS)]	Low

Other UCL projects on school infrastructure resilience

❑ School specific seismic fatality estimate

DS0	No fatalities or injuries. Eventually slight injuries that could be self treated.
DS1	Injuries requiring basic medical aid that could be administered by paraprofessionals.
DS2	Injuries requiring a greater degree of medical care and use of medical technology such as x-rays or surgery, but not expected to progress to a life threatening status.
DS3	Injuries that pose an immediate life threatening condition if not treated adequately and expeditiously.
DS4	Instantaneously killed or mortally injured

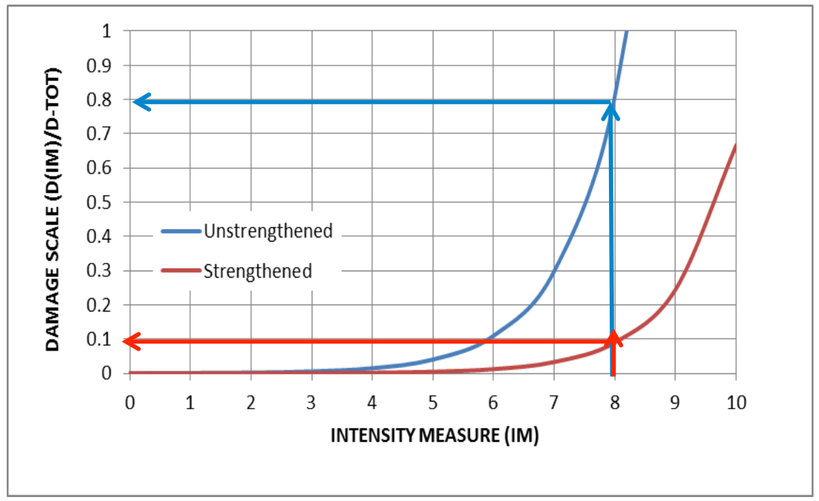


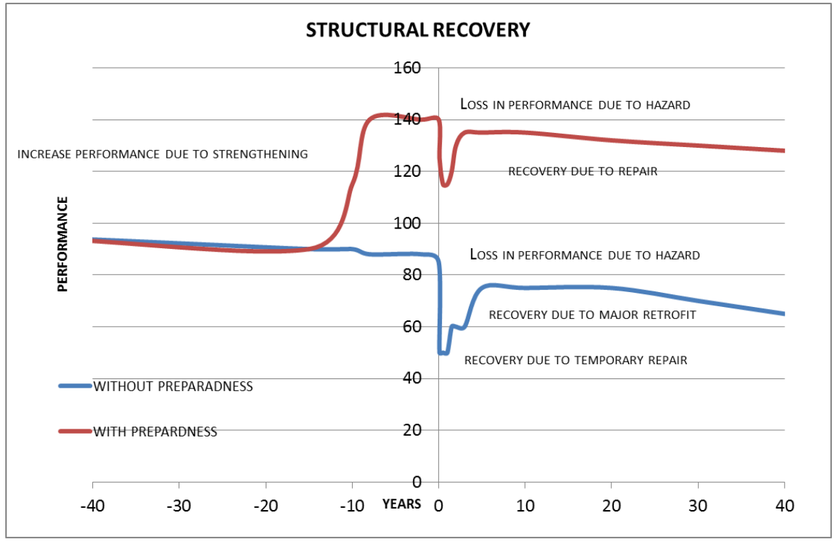


❑ Training

Other UCL projects on school infrastructure resilience

- **PRISMH: Philippines Resilience Of School Infrastructure To Multi Hazard**
  - Measure potential resilience improvements obtained by retrofitting school buildings and promoting a disaster risk reduction culture;
  - Escalate safer schools culture to safer community by evaluating the role of school infrastructure in post disaster recovery;
  - Develop practical tools for multi-hazards impact assessment and resilience improvement and demonstrate their capabilities in the case study of Cagayan de Oro (CdeO)1, Philippines.





Other UCL projects on school infrastructure resilience

- **CROSSH: China Resilience Of Schools to Seismic Hazard**
  - **Focus on school damage after the Wenchuan earthquake**
  - **Look at the path to recovery**
  - **Determine earthquake risk and resilience assessment framework**
  - **Disseminate the culture of safe schools and safe communities through demonstrations**

Losses in Wenchuan Earthquake		
Casualties		78,000+
Injuries		374,176
School Buildings /number		7,444
Medical Buildings /number		11,028
Rural Residential Buildings	Collapsed / $\times 10^4 m^2$	10,709.6
	Severely Damaged / $\times 10^4 m^2$	9,432.2
Urban Residential Buildings	Collapsed / $\times 10^4 m^2$	1,887.9
	Severely Damaged / $\times 10^4 m^2$	5,836.2

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