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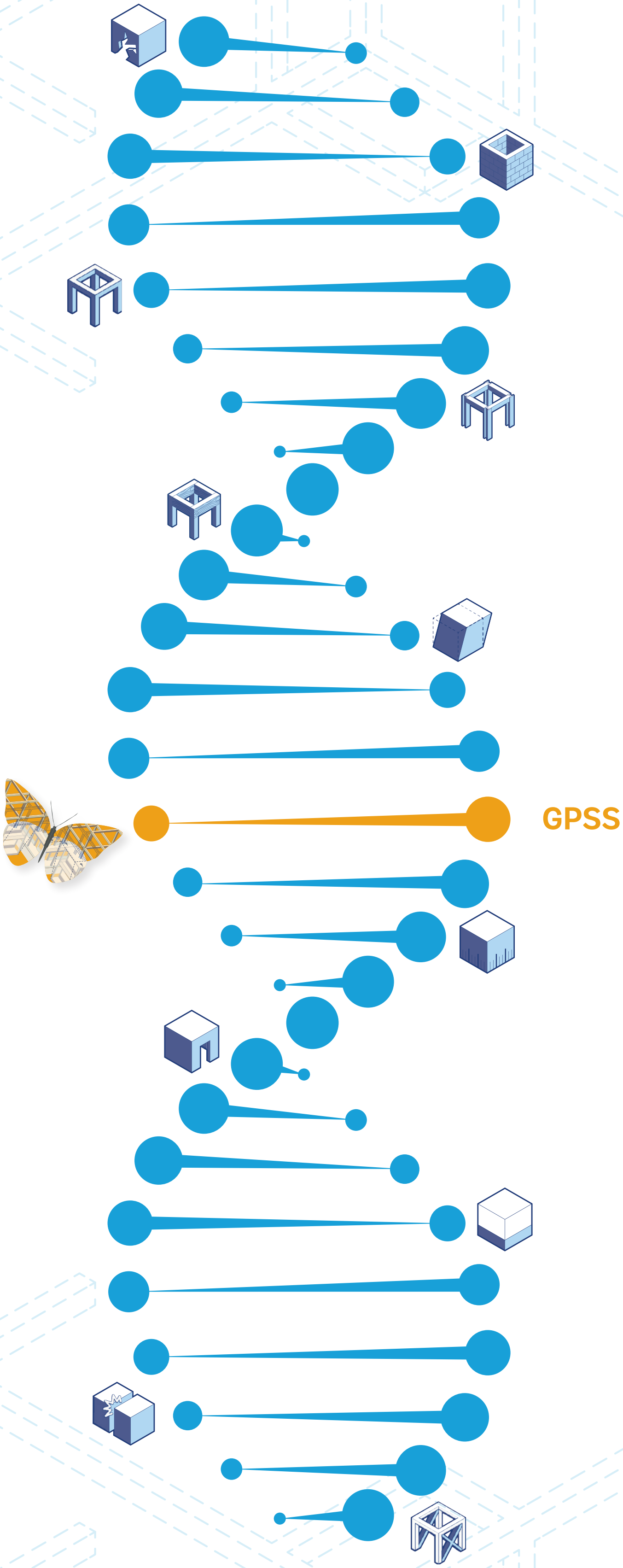

GLOSI THE GLOBAL LIBRARY OF SCHOOL INFRASTRUCTURE

Learn How to Apply the Taxonomy Guide

October 2019

WORLD BANK GROUP

GFDRR
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1818 H Street NW
Washington DC 20433
Telephone: 202-473-1000
Internet: www.worldbank.org

Graphic and design: Miki Fernández

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The Global Library of School Infrastructure (GLOSI) was created by **Fernando Ramirez Cortes** (Senior Disaster Risk Management Specialist), **Carina Fonseca Ferreira** (Disaster Risk Management Specialist), **Laisa Daza Obando** (Consultant), and **Jingzhe Wu** (Consultant) from the World Bank's Global Program for Safer Schools (GPSS).

The original analytical framework and content of the GLOSI was prepared by a technical team led by **Dina D'Ayala** (Project Director) from University College London, United Kingdom, and **Luis Eduardo Yamin** (Project Director) from Universidad de Los Andes, Bogotá, Colombia. The technical team comprised **Rohit Kumar Adhikari** (Project Specialist) from University College London, **Rafael Ignacio Fernández** (Project Specialist), **Angie Garcia** (Project Specialist), **Miguel Rueda** (Project Specialist) and **Gustavo Fuentes** (Project Specialist) from Universidad de Los Andes.

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Global Library of School Infrastructure

The World Bank's Global Program for Safer Schools (GPSS) launched in 2019 the Global Library of School Infrastructure (GLOSI). The GLOSI is a live global repository of evidence-based knowledge and data about school infrastructure and its performance against natural hazard events. A one-stop-shop with open access to global indicators on school infrastructure exposure and risk to natural hazards, taxonomy of school buildings, catalog of building types, fragility and vulnerability information, case studies on vulnerability reduction solutions applied around the world, and data collection tools. In-country data is also available with restricted access. The GLOSI is updated over time through World Bank-funded safer school projects and contributions from development partners with interest in this field.

Why do we need GLOSI?

Safer school projects have taught us that there are three main challenges to global dissemination of knowledge surrounding school building performance: communication to decision makers, the lack of a common language, and facilitation of quantitative risk assessment.

Global knowledge about school infrastructure performance needs to reach decision makers

The engineering community has achieved immense progress in the past few decades towards understanding building performance against natural hazards and devising scalable risk-reduction solutions. However, this knowledge has not reached decision makers nor has it been used to drive school infrastructure investments. Without this knowledge, the opportunity to maximize benefits from intervention and optimize investments in school safety can be lost.

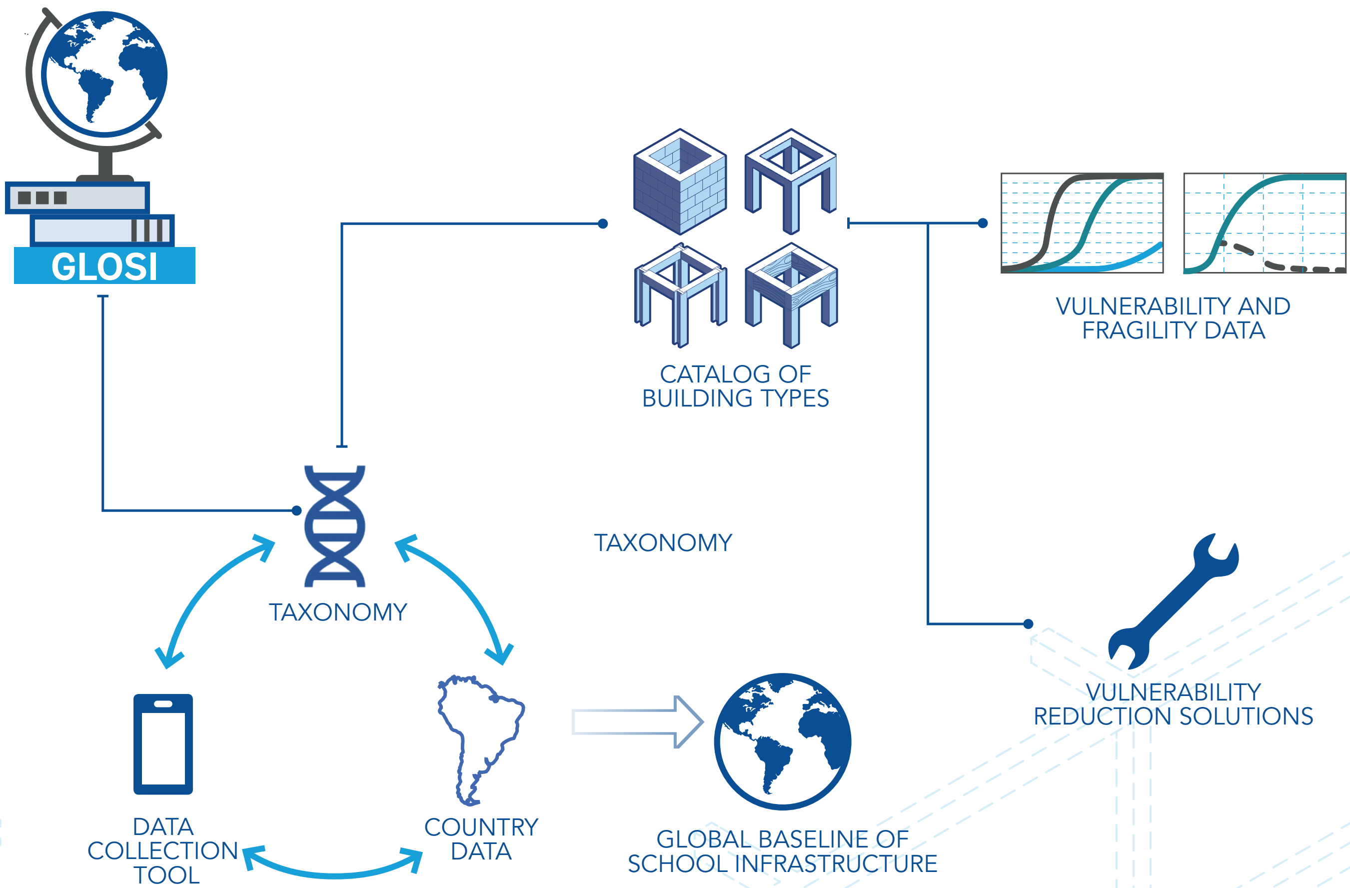
The first objective is to create a universal "language"

School buildings tend to follow standard designs, yet buildings with similar vulnerability are still difficult to identify in different countries, or even within a country. This is largely due to the lack of a systematic classification system and consistent vulnerability assessment framework. The GLOSI offers a solution by making a taxonomy and vulnerability assessment framework for school buildings globally applicable, and oriented to produce quantitative risk information that will inform large investments in school safety and resilience.

The GLOSI is a tool to mainstream quantitative risk assessment in investment planning

By using a systematic taxonomy, the GLOSI includes a catalog of typical school building types found in different parts of the world with the respective vulnerability data needed to conduct quantitative risk assessments. Countries can map their school facility portfolios with the catalog and use the GLOSI data to perform quantitative risk assessments or vulnerability analyses to identify cost-efficient retrofitting solutions. The availability of this information will ensure that results are scalable across countries and safer school engagements in each country begin with a solid existing technical foundation.

Global Library of School Infrastructure (GLOSI)



Learn How to Apply the Taxonomy

Here are two examples to walk you through the application of the GLOSI taxonomy.

Application Example for Load Bearing Masonry School Buildings

Taxonomy Parameters			Assigned String	Identified Attributes	Description
Primary	1	**Main Structural System**	UCM-URM4	Unconfined/ unreinforced masonry with rectangular block in mud mortar walls	The building is constructed in brick and mud mortar masonry.
Primary	2	**Height Range**	LR (1)	Low-rise (single storied)	This is a single-story building.
Primary	3	**Seismic Design Level**	LD	Low	This is an old building which the local communities constructed without following any seismic design guidelines. It does not include any seismic enhancement measures (e.g. seismic bands, corner ties, etc.). However, the walls are thick (one-and-a-half bricks) and constructed in English-bond masonry with proper interlocking with the cross-walls.
Secondary	4	**Diaphragm Type**	FD	Flexible diaphragm	The roof structure is a timber structure with low in-plane stiffness. The timber elements simply rest on top of the walls, indicating a poor connection to the load bearing wall system.
Secondary	5	**Structural Irregularity**	NI	No irregularity	This building has a regular rectangular plan shape and there are no horizontal or vertical irregularities.
Secondary	6	**Wall Panel Length**	LP	Long wall panel	The unrestrained wall panels between two consecutive cross-walls are longer than 12 times the wall thickness.
Secondary	7	**Wall Opening**	LO	Large opening	The door and window openings are large and in a wall between two consecutive cross-walls. The combined width of openings exceeds 50% of the wall length.
Secondary	8	**Foundation Type**	RF	Rigid foundation	The brick in mud mortar masonry walls in Nepal are usually laid on stone in mud mortar masonry work which is a strip foundation with a depth of about 1.5 m. The site is located in a medium soil.
Secondary	9	**Seismic Pounding Risk**	NP	No pounding	This is an isolated building with a sufficiently clear distance from other buildings.
Secondary	10	**Effective Seismic Retrofitting**	OS	Original structure	There has not been any effective retrofitting intervention post original construction.
Secondary	11	**Structural Heath Condition**	PC	Poor condition	The mud mortar used in the construction has deteriorated over time. There are existing seismic damages (cracks wider than 5 mm in the masonry walls, and partial collapse of gables).
Secondary	12	**Non-Structural Components**	VN	Vulnerable	The heavy masonry gables are standing freely and are very vulnerable during earthquakes. The connection of roof coverings to the roof structure is poor.
Building Type:			UCM-URM4 Low-Rise with Poor Seismic Design Level		
GLOSI Taxonomy String:			**UCM-URM4/LR(1)/PD**/FD/NI/LP/LO/RF/NP/OS/PC/VN		

Application Example for Reinforced Concrete School Buildings

Photo: © The World Bank

Taxonomy Parameters			Assigned String	Identified Attributes	Description
Primary	1	**Main Structural System**	RC2	RC moment resisting frame with masonry infills	This reinforced concrete building is a framed structure with masonry infills.
Primary	2	**Height Range**	MR(2)	Mid-rise (two stories)	This is a two-story building.
Primary	3	**Seismic Design Level**	LD	Low	This seems to be an engineered design. But the dimensions of the structural elements (columns and beams) indicate that it was designed for a low seismic hazard zone.
Secondary	4	**Diaphragm Type**	RD	Rigid diaphragm	The floor and roof appear to be made with a system of beams of reinforced concrete.
Secondary	5	**Structural Irregularity**	NI	No irregularity	This building has a regular rectangular plan shape and there are no horizontal or vertical irregularities.
Secondary	6	**Span Length**	SP	Short span	There is no exact measure of the span length, but it can be determined from the photo that it is less than 6 m.
Secondary	7	**Pier Type**	RO	Regular column	The section of the columns is bigger than that of the beams. Therefore, no weak column mechanism should appear.
Secondary	8	**Foundation Type**	RF	Rigid foundation	These structures are usually built with a concrete foundation, composed of isolated footings connected by beams. This type of system is commonly accepted in modeling as rigid.
Secondary	9	**Seismic Pounding Risk**	NP	No pounding	This is an isolated building with a sufficiently clear distance from other buildings.
Secondary	10	**Effective Seismic Retrofitting**	OS	Original structure	There has not been any effective retrofitting intervention post original construction.
Secondary	11	**Structural Heath Condition**	FC	Fair condition	The building seems to be in fair condition, the concrete and masonry elements do not present any evidence of poor condition.
Secondary	12	**Non-Structural Components**	VN	Vulnerable	The gables do not have any concrete element on the top, which makes them a vulnerable component.
Building Type:			RC2 Mid-Rise with Low Seismic Design Level		
GLOSI Taxonomy String:			**RC2/MR(2)/LD**/RD/NI/SP/RO/RF/NP/OS/FC/NN		

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Contact information
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