Understanding the Construction Environment using a Systematic Approach

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A Roadmap for Safer Schools
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ARUP

THE WORLD BANK
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GFDRR
Global Facility for Disaster Reduction and Recovery

Step 2
Construction Environment

Purpose
To gain an understanding of the institutional environment and regulatory framework within which school infrastructure is planned, designed, constructed, operated, maintained, repaired, and retrofitted in order to determine the factors placing school infrastructure at risk.

Objectives
- **A** Understand the strengths and weaknesses of the regulatory framework
- **B** Understand the strengths and weaknesses of the process for implementing school infrastructure
- **C** Identify vulnerabilities in the construction technology used for school infrastructure
- **D** Identify opportunities to improve the safety of school infrastructure

MODULE	ACTIVITY	OBJECTIVE
2.1 **Regulatory Environment**	**2.1.1** Identify the planning regulation documents and understand what they cover and exclude	A D
	2.1.2 Identify the building regulation documents and understand what they cover and exclude	A D
	2.1.3 Map the history of the regulatory documents	A D
	2.1.4 Identify the regulatory process	A D
2.2 **Implementation Process**	**2.2.1** Map key stakeholders	B D
	2.2.2 Identify capacity and capability of key stakeholders	B D
	2.2.3 Identify procurement and construction management processes	B D
2.3 **Construction Technology**	**2.3.1** Identify typical construction materials	C D
	2.3.2 Identify school infrastructure designs	C D

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2.1 Regulatory Environment

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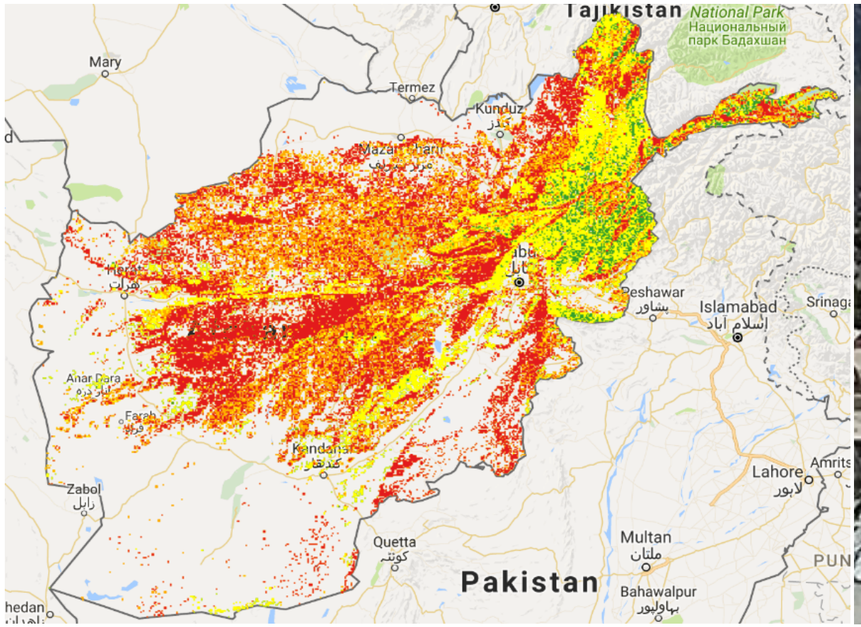
- **2.1.2** Identify the building regulation documents and understand what they cover and exclude
- **2.1.3** Map the history of the regulatory documents
- **2.1.4** Identify the regulatory process



Landslide hazard map for Afghanistan from Deltares Study 2016

Schools exposed to landslide and rock fall in Afghanistan

- ❑ Location
- ❑ Site Planning
- ❑ Is there a development plan?
- ❑ Are up to date hazards included?

2.1 Regulatory Environment

2.1.1 Identify the planning regulation documents and understand what they cover and exclude

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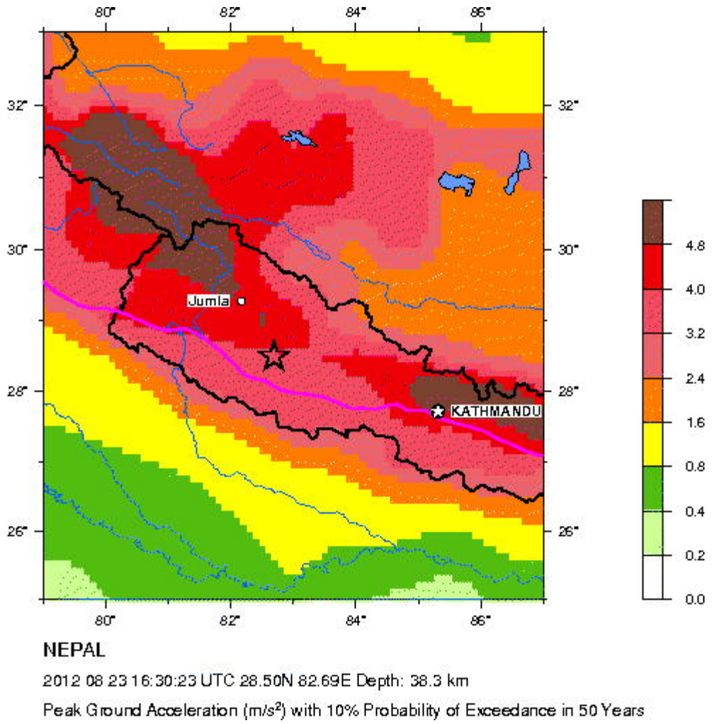

Seismic Hazard Map, Nepal

Earthquake damaged school, Nepal 2015

- ❑ Building Design
- ❑ Construction
- ❑ Are up to date hazards included?
- ❑ Are school buildings included?

2.1 Regulatory Environment

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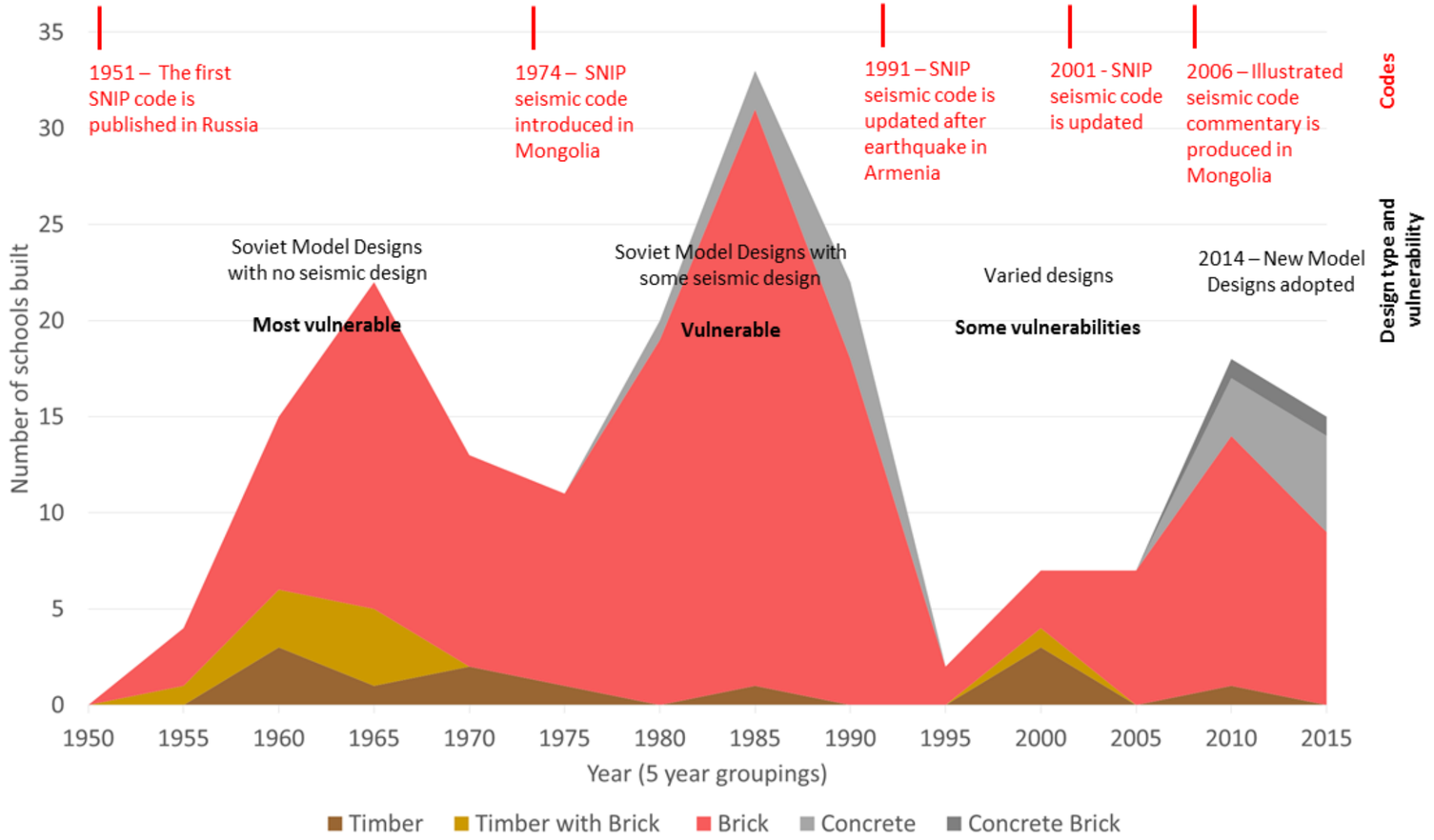

- ❑ Latest technology
- ❑ Current hazard data
- ❑ Impact on historical building vulnerability

Key building code updates in Mongolia relating to school building design and vulnerability

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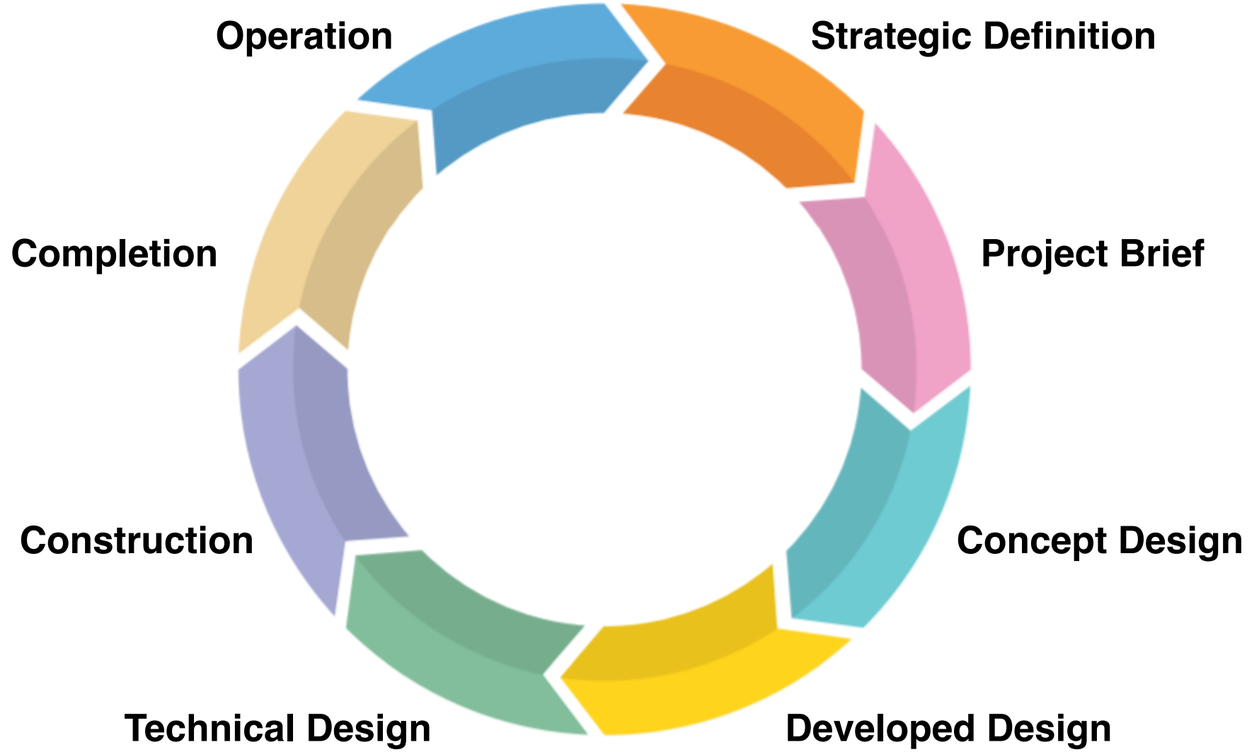

- ❑ Approvals Process (planning and design)
- ❑ Construction Certification
- ❑ Enforcement?

RIBA construction project stages

2.2 Implementation Process

2.2.1 Map key stakeholders

2.2.2 Identify capacity and capability of key stakeholders

2.2.3 Identify procurement and construction management processes

Stage	Task	Stakeholder Responsible	Description
Planning	Needs Assessment	MESC	Community identifies need for a new school and alerts MESC. MESC appraises the communities request for assistance and prioritises works. Sometimes community liaises with and applies directly to a donor.
	Site Selection	Community	Schools are typically built on customary land and the site is agreed within the community.
	Development Consent	PUMA	PUMA review project proposals and if necessary seek the input from other authorities (DMO). PUMA will determine if an EiA is required. Depending on the nature of the development, a PEAR or CEAR is required to be submitted for approval.
Design	Delivery	Private Consultant	MESC, through a 10 week tender process, hire an engineering consultant who develop the design based on the MESC's standard education specifications.
	Building Permit	MWTI - Building Division	Drawings are submitted to the MWTI who review the design to ensure compliance with the NBCS and issue a Building Permit
Construction	Procurement	MWTI - Building Division	MWTI assess tenders and have a list of approved registered contractors. Contractors with a record of poor workmanship are blacklisted and are not permitted to work on public building projects.
	Contract Management	MESC	
	Supervision	MWTI- Building Division	If included in the original ToR the engineering consultant will have role to assure quality during construction. The MWTI's role remains provide periodic inspections to ensure quality.
	Occupancy Certificate	none	not required under current regulations
Operation and Maintenance	Ownership	School Committee	On completion of construction the school is handed over to School Committee. The MESC is responsible for supplying teachers and resources.
	Maintenance	School Committee	The School Committee can apply for funding from the MESC to carry out maintenance. Other funds are raised by the community directly.

- ❑ Who is involved in school construction
- ❑ Roles and Responsibilities
- ❑ Lines of communication
- ❑ Gaps / overlap

Stakeholder roles and responsibilities in Samoa

2.2 Implementation Process

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2.2.3 Identify procurement and construction management processes

Stage	Organisation	Capacity
Planning and Design	Consulting Companies	500 Licensed design companies, but few with good seismic capacity 40 Design Expertise licences which include seismic capability Seismic understanding focussed on analysis, not design detailing Seismic design not taught at university No professional accreditation body
	MoUD Licencing Centre	There are 8 staff, some with technical engineering or architectural background, monitoring 20 to 30 licencing applications per month. Licensing requires 3 years post graduate experience from company key staff. Licences are revoked for poor performance, which happens about 10 to 15 times per year. Licences granted to Companies for Design, Design Expertise (e.g. seismic), Construction, and Technical Supervision
Construction	Contractors	1000 Licensed Contractors, few with good seismic understanding
	Technical Supervisors	400 Licensed Technical Supervisors, few with good seismic understanding
	MoUD Inspectorate	The MoUD is only able to attend site once a year, and quality of construction is assured by the Technical Supervisor on a daily basis.
	Head of Community	Skills and experience varies, likely to be limited appropriate technical capacity. Therefore:- For Planning approval they rely on the community Masterplans, which exist in only half the communities, and even then they are not coordinated with existing hazard information which needs to be requested on a case by case basis from the MoTAES. For Design approval they rely on the Expertise design checker. For construction certification they rely on the technical advisory committee which is made up of the technical consultants and contractor plus the MoUD and any additional expert stakeholders involved in the project.
O&M	Headmasters	No technical capacity, maintenance is coordinated through local contractors

- ❑ Skills, expertise and capacity
- ❑ Education / professional qualifications for Consultants
- ❑ Contractors / Builders
- ❑ Institutional capacity to enforce regulations

Stakeholder capacity assessment in Armenia

2.2 Implementation Process

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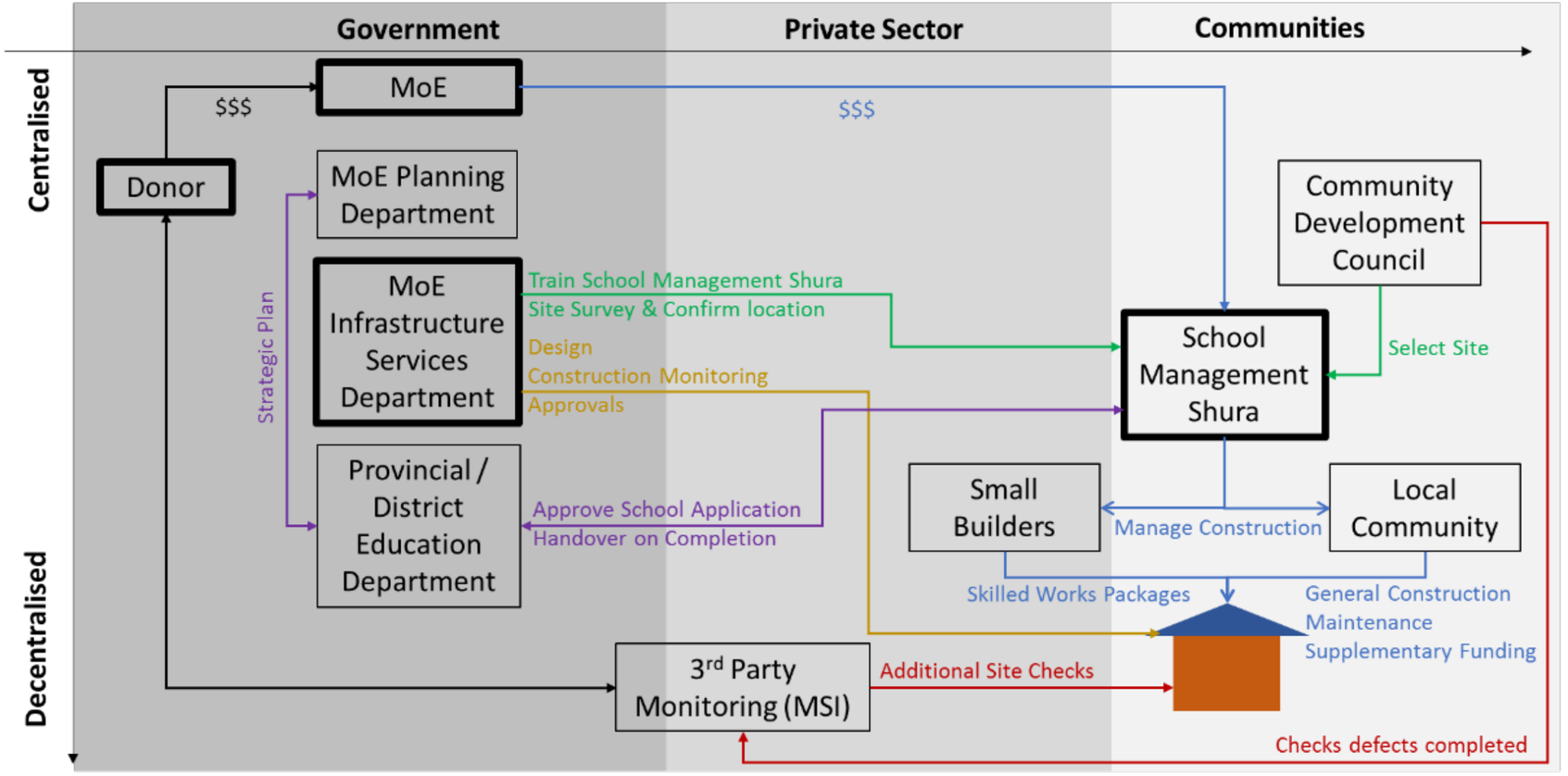

- How are construction services secured and managed?
- Contractor Build
- Community Build

Procurement and construction management roles and responsibilities for community managed construction in Afghanistan

2.3 Construction Technology

2.3.1 Identify typical construction materials

2.3.2 Identify school infrastructure designs

- ❑ Material availability
- ❑ Material quality and certification
- ❑ Materials used in schools
- ❑ Materials covered by codes

Remote school built using rendered masonry, reinforced concrete, timber and zinc sheeting in Indonesia

2.3 Construction Technology

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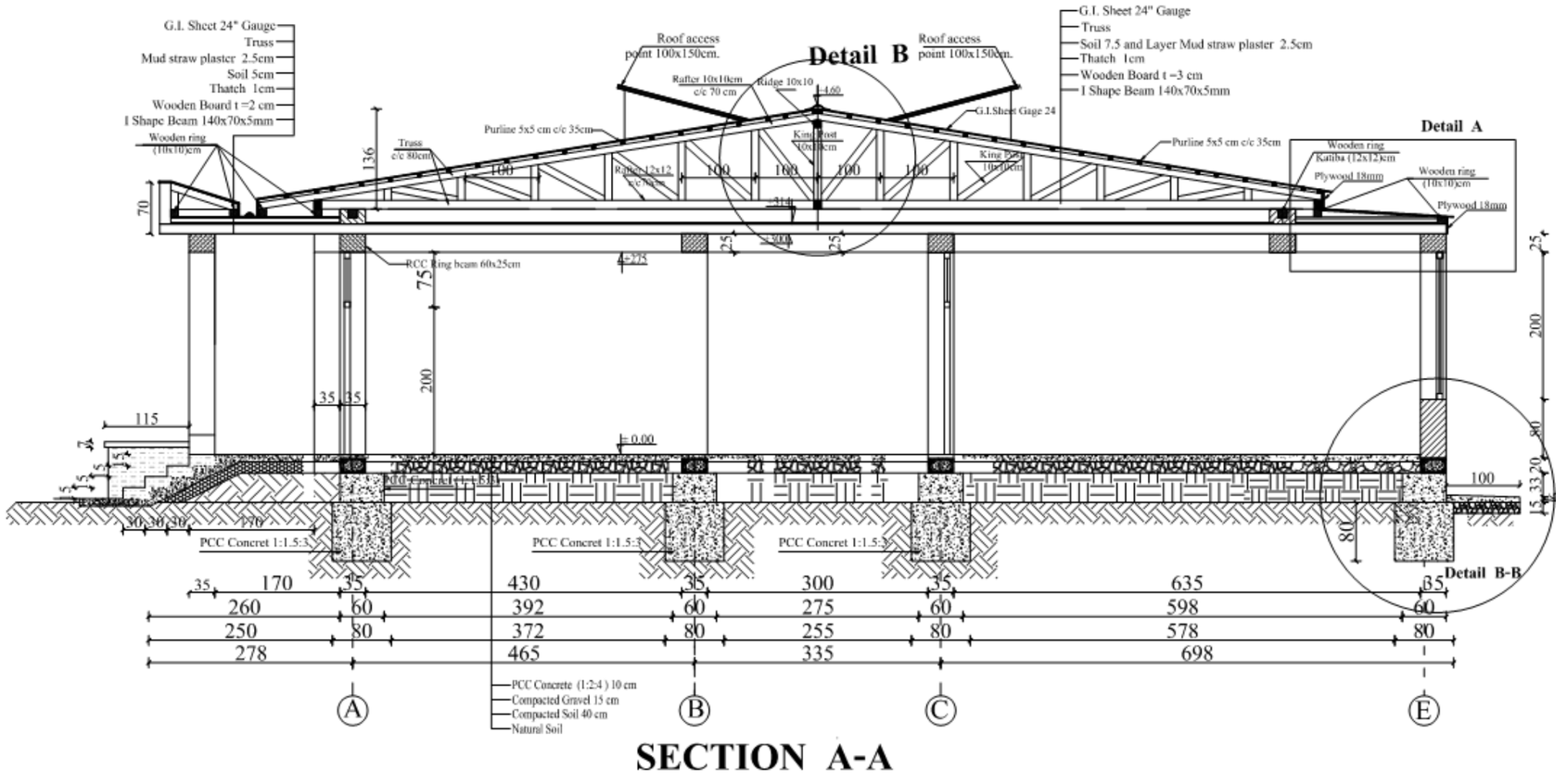


- Model Designs
- Code compliance
- Appropriate for natural hazards
- Appropriate for skills and materials available
- Appropriately communicated

MINISTRY OF EDUCATION DEPARTMENT OF CONSTRUCTION	STANDARD SCHOOL DESIGN IN AFGHANISTAN	PROJECT NAME	8 Class Room-Burnt Brick-I-beam- Iron Sheet PCC Foundati With Laboratory and Computer Lap
		DRAWING TITLE	GROUND FLOOR PLAN

Model school construction drawings, Afghanistan

Activity – Stakeholder Mapping (15 minutes)

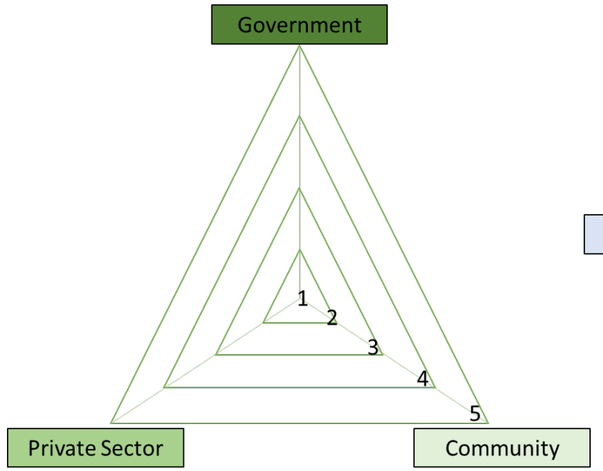
Part 1 – Identification & Assessment

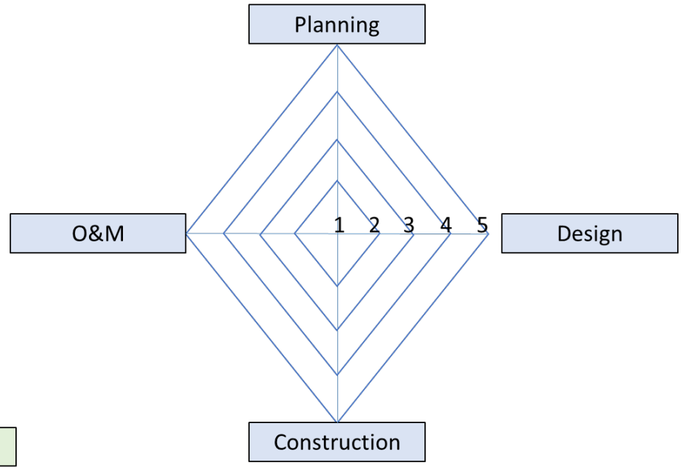
1. Enter the key stakeholders into this table
2. Assign a capacity/capability score 1-5 (5 = high)
3. Calculate the average scores for sectors and stages

	Stakeholders						
Project Stage	**Government**	Score	**Private Sector**	Score	**Community**	Score	Average Score
Planning							
Design							
Construction							
Operation & Maintenance							
Average Score							

Part 2 – Evaluation

4. Plot the sector and stage average scores on these diagrams





5. Submit your Poll Everywhere votes for priority areas for improvement for sectors and stages:
   - Which stakeholder sector requires most improvement?
   - Which stage in the process requires most improvement?

Activity – Stakeholder Mapping (15 minutes)

Part 1 – Identification & Assessment

1. Enter the key stakeholders into this table
2. Assign a capacity/capability score 1-5 (5 = high)
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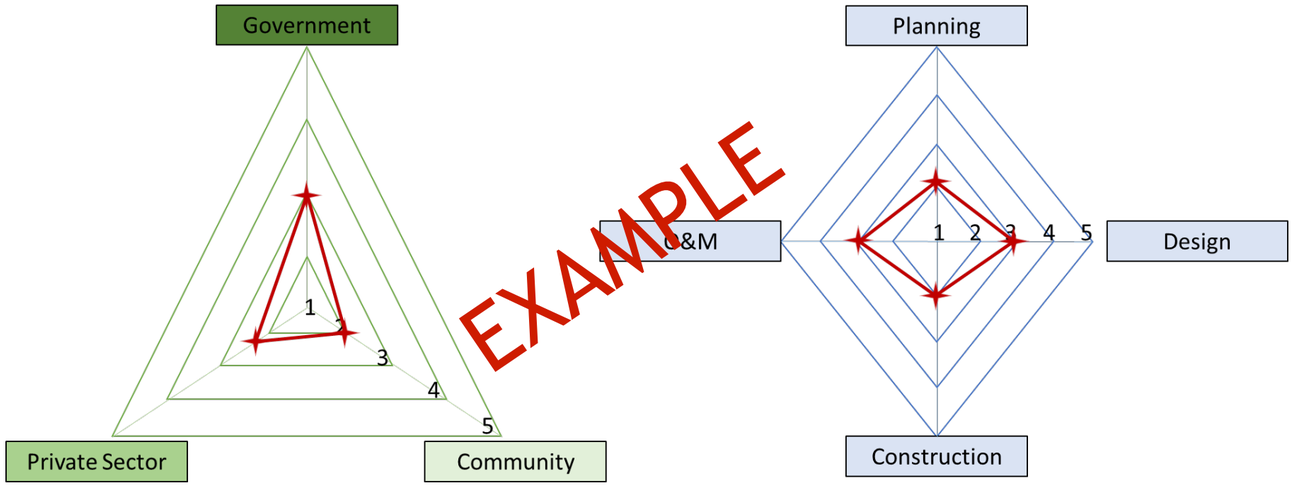
	Stakeholders						
Project Stage	Government	Score	Private Sector	Score	Community	Score	Average Score
Planning	Ministry of Education	3	Design consultants	2	School Management committees	2	2.3
Design	Ministry of Public Works	3	Design consultants				3
Construction	Ministry of Public Works	2	National Contractors Local Builders	2			2
Operation & Maintenance	District Department of Education	4			School Management committees	2	3
Average Score		3.0		2.3		2.0	

EXAMPLE

Part 2 – Evaluation

4. Plot the sector and stage average scores on these diagrams



EXAMPLE

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