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“Normality back better” through reconstruction

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Abstract

The process, for the reconstruction post emergency of public buildings in developing countries, has been elaborated through different professional experiences in Post Emergency Programs. It could be considered as a guide to be used for optimizing the resources and times in each phases' reconstruction from design to construction works.

The main objective of process is to reconstruct the normal condition life through an appropriate architecture guaranteeing the integration in the community, in the village, in the city, in the territory through the respect of social, cultural, religious, economic, political reality. To achieve it, the general objective has been structured in the following six specific objectives: I) To reconstruct the **Identity**; II) To interpret the **Needs**; III) To optimize the **Limits**; IV) To reduce the **Vulnerability**; V) To sustain the **Transformability**; VI) To get the **Resilience**.

The above objectives are reachable through the sequential phases: 1) Identification of components; 2) Data collection for each component; 3) Cognitive and Interpretative Analysis of components; 4) Elaboration of components for each specific objective; 5) Architectural/Structural Composition; 6) Construction works.

In particular, the *phase 1 Identification of components* is the first important step to determinate all components that should be considered as part of the architectural/structural composition, in fact each one has specific weight on the single choice both for the design and the construction. As a consequence, to ensure the appropriate integration, each component is strongly connected in the social, cultural, religious, economic, political context.

The systematic actions with relative results of the process will be illustrated through the New Swat Archaeological Museum in Saidu Sharif (Pakistan) reconstructed after the 2005 earthquake and 2008 terrorist attack. The New Museum reconstructs the great cultural and social value for the community getting all above objectives through an appropriate architecture integrated in the context joining tradition and innovation.

Keywords: Identity; Needs; Limits; Transformability; Resilience.

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Introduction

The process for reconstruction post emergency of public buildings has been elaborated and structured during personal 10 years' experience, as construction supervisor and project designer,

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in different developing countries¹. Thanks to their social, cultural, political and economic value, the public buildings assume a fundamental role of public buildings as driving force to reconstruct the "normality" after disaster. As a consequence, it has been necessary a reflection about the renewed strategic role of architectural/structural composition, both theoretical and practical point of view, that starts from a systematic process with the scope to optimize the actions in the complex scenery of reconstruction post emergency for avoiding any prefabricated solutions. In other words, this process, through the definition and the organization of resources and tools, could be considered as a guide to accelerate the architectural and structural joined choices, both in design and in construction works, defining adaptable actions to different contexts.

General objective: to reconstruct the public buildings through an appropriate architecture integrated in the territory, in the environment, in the city, in the village, in the community through the respect of social, cultural, religious, economic, political reality.

Specific objectives identified by keywords in bold:

- To rebuild the **Identity** through communicative and cultural memory (Cuzmalo, 2012);
- To interpret the **Needs** in emotions and functions involving all stakeholders in particular the community (Gropius, 1963);
- To optimize the intrinsic **Limits** in social, economic, cultural, territorial, political, normative context that strongly compromise the positive result of project because of incapacity to manage the post-emergency reconstruction (Chang et al. 2010);
- To reduce the **Vulnerability** with the improvement of local accessible resources (materials, techniques, capacity workers);
- To guarantee the **Transformability** to be sustainable with flexible and modular structure with easy maintenance and adaptable to possible transformations (Ceragioli 1969);
- To reach the **Resilience that involves all above** to be find in the capacity of architectural and technological choices to got a resilient building.

Follow the sequential Phases with relative results expected:

Phases	Results
1 Identification of components	Components' list with specifications
2 Data collection	Documents' list with relative source for each component
3 Cognitive/interpretative Analysis	Conclusion and recommendations about the use of single component and the weight of each component on the 5)
4 Elaboration	Interlink between components and for each specific objective;
5 Architectural/structural composition	Architectural/structural project: plans; sections; elevations, 3d
6 Construction work	Master Plan; technical and financial monitoring schedule.

¹ Pakistan, Srilanka, Mali, Eritrea in Post-Emergency Reconstruction Programs with UN-Agencies, International governmental and not Governmental Organizations.

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For *components* means elements of the architectural/structural composition, so, in order to obtain an integrated solution, they are both strongly connected to the context and to the public building to be reconstructed.

All phases could be executed through communication, cooperation, collaboration between architect and all stakeholders involved (local authorities; donors; international organizations; contractors; community) especially with beneficiary community. In addition, the choices relative of *Phase 5 Architectural/structural composition* should be defined on the base of the three fundamental dimensions of post-emergency reconstruction projects: social responsibility, economic responsibility and environmental sustainability (Lizarralde et al. 2010).

The process will be illustrated through the New Archaeological Museum in Saidu Sharif (Pakistan) reconstructed, after 2005 earthquake and 2008 Taliban attack emergency, inside ACT-Field School Project² with a professional team under the coordination of arch. Ivano Marati and arch. Candida M. Vassallo to design a new master plan and to supervise the construction works.

The Phases of reconstruction design process will be illustrated briefly as follows: Phase 1-2-3 in fig. 1; Phase 4 in fig. 2; Phase 5 through the six specific objectives.

COMPONENT	PHASE 1 Identification	PHASE 2 Collection*	PHASE 3 Cognitive/interpretative Analysis
Existing building	Historical reconstruction	AN; IAM DOAM;	The Museum was erected in 1959 to house the artefacts unearthed during the excavation campaigns in the Swat Valley in last 50 years.
	Configuration	AN; DOAM; I; IAM	The geometrical and volumetric transformations, to increase exhibit space, have severely compromised its strength and stability due to an uneven and heterogeneous execution.
	Cultural and social value	IAM; DOAM; B; I; PA	Attraction for researchers and tourists from the world thanks to its unique Gandharan collection and the archaeological and artistic antiquities from 3000 BCE to almost the modern era.
	Pre-disaster state	AN; DOAM	Drawings (plans; sections; elevations; 3d); Pictures from first construction and during different transformations;
	Structural Health Assessment	UTE	Causes' disaster: earthquake 7.6 on Richter Scale in October 2005; terrorist attack in November 2008; Post-disaster state: drawings(plans; sections; elevations; 3d); Pictures of damages; Field and laboratory materials tests; numerical and analytical evaluation of existing structure; Recommendations: demolition of two galleries at the front, retrofitting for remaining part of building.
Requests' Stakeholders	New building	I; M	Monumental and symmetric building
	Safe building	L; I; M	Anti-seismic structure; security and emergency plan;
	New spaces	I; M	Galleries and a conference hall;
Context	Urban	I; M; NA	Saidu Sharif, capital of Swat from 1917; from 1949 until 1969 with strong urban regulations; from 1970 chaotic urban assignment;
	Political	I	Military occupation due to Taliban insurrection of in 2008.
	Religious		Islamic
History	Archaeology	IAM	Rich archaeological patrimony from 3000 BCE to 21 st century CE
	Architecture	I; M; IAM	Local fortified edifices; monasteries; European style mixed with Islamic tradition
	Culture	AP; B	Islamic and Gandharan
Risks	Ethnic group	AP; B	Pashtun
	Earthquake	I; B	seismic zone;
	Climate	B;	Monsoons;
Shortage	Security situation	I; AP	political problems
	Electricity	OF	
	Skilled workers	OF	limited by local technique and materials available;
Technology	Technical monitoring	OF	Not continuative because of security reasons and monsoons ;
	Techniques	I; M; UTE; OF; A	Traditional and current constructive techniques: steel structures; block cements clad with stone;
	Materials	I; M; UTE; OF; A	steel; cement blocks; stones; bricks;
	Retrofitting	UTE; A	Techniques and materials: concrete stitching; ferro cement overlay; grout injection in masonry wall; wire mesh application; fixing injection nozzles; steel reinforcement structure; plinth protection;
	Skilled Workers	I; A; PA	Steel structure; masonry walls;
Normative	Laws	IRG; NRG	Guidelines and regulations for reconstruction post-earthquake
Budget		ACT	350,000 euro
Duration	Project	ACT	March 2011/June 2013
	Life Building	ACT	long
Case study	Architecture	B, OF	International Islamic Museum Doha, arch. Ieoh Ming Pei
	Patterns	B, OF	Islamic and Gandharan symbols

Fig.1 Phase 1, 2, 3
LEGEND(sources)*:
A=Assessment; ACT=ACT's Project; B=Books; DOAM= Directorate of Archaeology and Museum's Records; I=Interviews; IRG=International Regulations and Guidelines; IAM=Italian Archaeological Mission's Records; M=Meetings; NA=National Archives; NRG=National Regulations and Guidelines; O=On field; PA=Participatory Approach; UTE= Consultancy Cell from University of Engineering and Technology Peshawar.

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² Archaeology-Community Tourism Field School is a three-years project of Italian Archaeological Mission (IAM) and Directorate of Archaeology and Museum, KP Province (DOAM) founded by "Pakistan-Italian Debt Swap Agreement" (PISDA).

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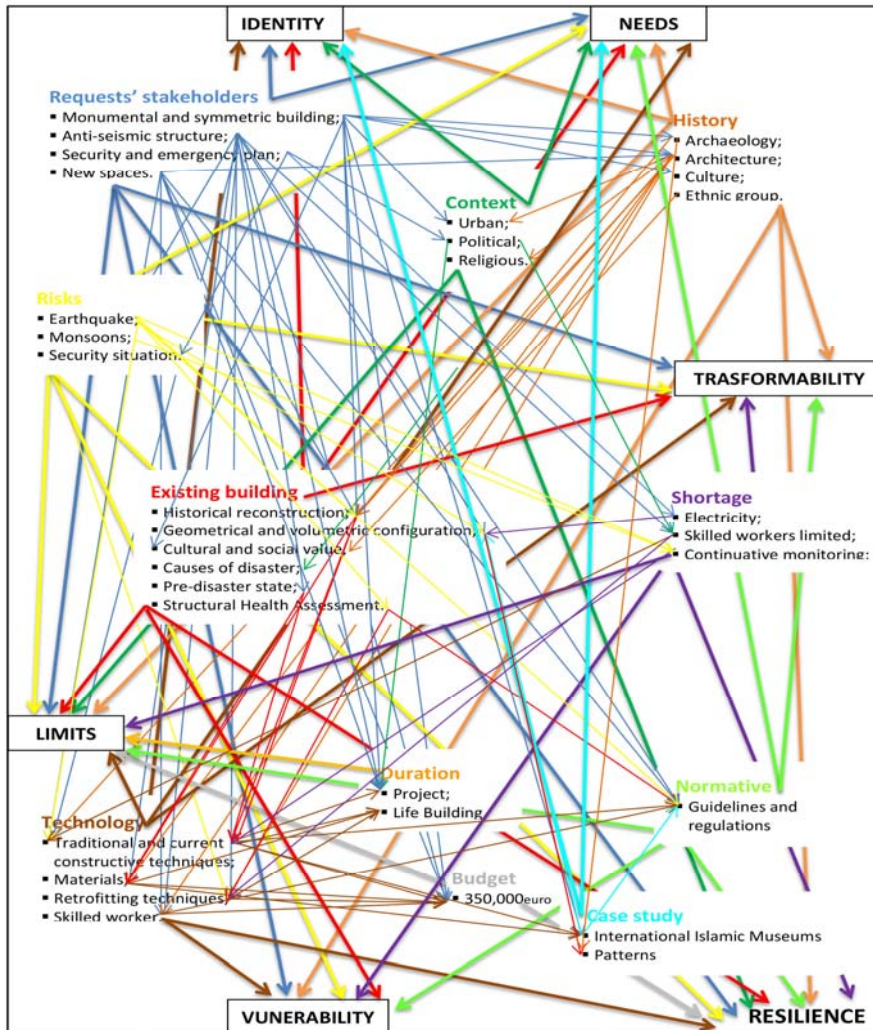


Fig. 2 Phase 4 Elaboration: interlink between components and for each specific objective (IDENTITY, NEEDS, TRASFORMABILITY, LIMITS, VUNERABILITY, RESILIENCE)

Follows the Phase 5 Architectural/structural Composition illustrated through the architectural/structural project (Marati, Vassallo; 2013) showing "HOW" each specific objective has been achieved.

Considering the great significant for the community, the new **Identity** has been reconstructed in according both its social and architectural context, finding its connections in the forms and volumes of the local fortified edifices, that abound in the area, to ward off both the chaotic encroachment of the city and the possible risks. (fig. 3)

Fig. 3 The New Swat Archaeological Museum: external



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Fig. 4 Second



Fig. 5 Gallery 4

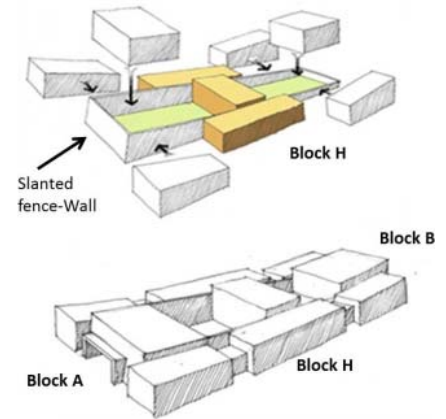


Fig. 6 Architectural composition

After the demolishing of frontal part, the functional **Needs** have been obtained adding two new blocks (A on the front and B on the back) with resting block H. The architectural composition (fig. 4,5,6,7,8) is achieved by the contraposition and integration of the three blocks' volumes (A, H, B) that, connect by two courtyards and the four emergency exits' nodes, are enclosed by an imposing slanted fence-wall that asserts its strength in the central part of the facade and regresses to reveal the soul of the steel structure.

The emotional **Needs** through the fence is a virtual connection that, combining the past and the present, takes the visitor from the entrance and leads him around the exhibition, becoming an integral part of the exhibits in the courtyards with imprints of proto-historical rock painting. The volumes of the blocks, in different heights and slopes, create a rhythm of solids and voids, where natural light, local materials, Islamic and Gandharan decorative motifs are an integral part of the whole composition.



Fig. 7, 8 Plan and Longitudinal Section

The **Limits** (as for components: risks; technology; shortage; budget fig. 1) imposed by context have strongly conditioned the choices of architectural/structural in the use of steel modular structure; of natural light through the courtyards; of local materials; of local constructive techniques improved as for international anti-seismic standards.



As for the conclusion and recommendation coming from the Structural Health Assessment³ the **Vulnerability** in the existing building has been reduced with the selective demolition of the frontal part and the retrofitting of the remaining "block H" with specific interventions for seismic structural upgrades. In addition for new blocks, the **Vulnerability** has been reduced through improvement and the optimization of the local resources in technology (materials and techniques) and in training of local workers.

The two new blocks, "block A" on the front and "block B" on the back, were built with an anti-seismic modular structure⁴ that consists of: foundation in plinths connected by beams in reinforced cement concrete; vertical and horizontal steel modular elements; ventilated walls with a double reinforced wall encompassing the vertical structure. The use of steel modular elements permitted to reduce the risks and shortages (fig. 1) thanks to the acceleration of execution time, thereby ensuring adequate monitoring of the modules' construction in workshop, and their on-site assembly.



Fig. 9 Block A: steel structure;

To guarantee the **Transformability** to be sustainable with flexible and modular structure with easy maintenance and adaptable to possible future transformations (fig. 9).

The **Resilience** in Museum building has been obtained thanks to its architectural/structural system able to resist to any type of impact, reserving the own structural features and maintaining own stability control.

In the end, as for the process' scope the New Swat Archaeological Museum gets an appropriate integration in the context through the achievement of all six objectives.

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³ SHA executed by the University of Engineering and Technology (UET), Peshawar, Pakistan.

⁴ The structure was designed in collaboration with prof. eng. Claudio Cristilli Department of Architecture, University of Naples "Federico II" in collaboration with AIRES Engineering, Caserta

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Author's Biography



Architect specialized in “Engineering of Emergency” and in “Technology and Architecture of Developing Country Urban Areas”, with more than 10 years’ experience as construction supervisor, project designer in Post-Emergency Programs with Ingo, Governmental and UN Agencies in Pakistan, Sri-Lanka, Mali, Montenegro, Eritrea and Italy.

Main areas of responsibility: to define strategical approach from design to construction; to determinate the appropriate constructive technologies; to guarantee the positive result through an detailed cognitive/interpretative analysis of social, cultural, political and economic context.