Support Action for Strengthening PAlestine capabilities for seismic Risk Mitigation SASPARM 2.0

Deliverable D.A.7

Technical Report

ECHO/SUB/2014/694399 - SASPARM 2.0 Support Action for strengthening PAlestine capabilities for seismic Risk Mitigation
Project co-funded by ECHO - Humanitarian Aid and Civil Protection

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1 INTRODUCTION

After the SASPARM FP7-Project (www.sasparm.ps), people living in Palestine have shown a great interest and more awareness regarding the concept of the seismic risk, which is given by the convolution of hazard (i.e. measure of the shaking severity), exposure (as scale of the impact of the damage) and vulnerability (measure of how prone a structure is to be damaged by the ground shaking). The only element on which it is possible to act for seismic risk mitigation is the vulnerability. For this reason, a new Building Seismic Code has been introduced in Palestine. This context encouraged a new project, SASPARM 2.0, with the cooperation of the Europe's neighbours in the framework of the European Research Area (ERA), started by SASPARM. The European Centre for Training and Research in Earthquake Engineering (EUCENTRE), acting as Coordinator, the Institute for Advanced Study of Pavia (IUSS) and An-Najah National University (ANNU) in the Palestinian-administered Areas (PS) are working together to support both local community and local practitioners, as well as the Governmental (GO) and Non-Governmental (NGO) stakeholders, to monitor their buildings and identify the right application and implementation of the new Seismic Building Code for the mitigation of seismic risk in their country. The final product of the SASPARM 2.0 project will be the development of a web portal where different users (students/citizens/practitioners/GO and NGO stakeholders) will be able to input and manage data regarding buildings, collected through forms whose detail will increase in function of the level of knowledge of the compiler.

The work of SASPARM 2.0 is organized in 8 operative tasks, each of which has to be carried out by the participants to the project under the coordination of a task leader:

1. Management and Reporting to the Commission (The task leader is EUCENTRE);
2. Collection of vulnerability data on buildings (The task leader is ANNU);
3. Prevention and mitigation of seismic vulnerability (The task leader is IUSS);
4. Training for target groups (The task leader is IUSS);
5. Development of guidelines for risk management policy considering the socio-economic impact (The task leader is IUSS);
6. Development and implementation of vulnerability models for the evaluation of seismic risk (The task leader is EUCENTRE);
7. Development of the Web-Based Platform (WBP) for seismic risk mitigation (The task leader is EUCENTRE);
8. Publicity (The task leader is ANNU).

This Technical Deliverable (D.A.7) describes the performed activities and the used resources of the first eight months of SASPARM 2.0. It is composed of different chapters, each of which corresponds to a task activity carried out by the partners.

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2 MANAGEMENT AND REPORTING TO THE COMMISSION (TASK A)

2.1 Grant agreement (D.A.1)

The specifics of the Civil Protection project "Support Action for Strengthening Palestine Capabilities for seismic Risk Mitigation 2.0", in short SASPARM 2.0, are:

- Grant agreement reference: ECHO/SUB/2014/694399, signed on 01/12/2014;
- Starting date: 01/01/2015;
- Duration of the project: 24 months;
- Maximum eligible costs of the project: € 666.644,00;
- EU-funding rate: 75,00%;
- Maximum EU-contribution: € 499.983,00.

The project partners (the coordinator EUCENTRE and the beneficiaries ANNU and IUSS) have approved and signed the grant agreement sent by the European Commission.

The Grant Agreement signed by the project partners and the European Commission includes special conditions, general conditions ("GC"), full project proposal and other annexes, and forms an integral part of the Co-operation agreement.

2.2 Consortium Agreement (D.A.2)

The internal co-operation agreement concerning the European Project SASPARM 2.0 between EUCENTRE, as coordinator of the project, and ANNU and IUSS, as beneficiaries, was signed on February 22 and 23, respectively.

Table 2.1 shows the project tasks, the participants and the leader of each task, whereas Table 2.2 Table 2.3 and Table 2.4 show the estimated eligible cost in € of the tasks for ANNU, IUSS and EUCENTRE respectively. Such tables are included in the Consortium Agreement.

Table 2.1: Tasks and participants

Task	Title	Participants	Leader
A	Management and Reporting to the Commission	All	EUC
B	Collection of Vulnerability Data on Buildings	All	ANNU
C	Prevention and mitigation of seismic vulnerability	All	IUSS
D	Training for targeted groups	All	IUSS
E	Development of guidelines for risk management policy considering the socio-economic impact	IUSS, ANNU	IUSS
F	Development and implementation of vulnerability models for the evaluation of seismic risk	EUC, IUSS	EUC
G	Development of the Web-Based Platform (WBP) for seismic risk mitigation	EUC, IUSS	EUC
H	Publicity	All	ANNU

Table 2.2: Eligible costs for ANNU

Cost category	Task A	Task B	Task C	Task D	Task E	Task F	Task G	Task H	Total €
Personnel	5.250	11.250	15.175	55.125	2.250	0	0	12.600	101.650
Travel and subsistence	10.500	0	0	1.200	0	0	0	2.000	13.700
Equipment	0	0	0	0	0	0	6.667	0	6.667
Sub-contracting/External assistance	0	0	0	0	0	0	0	0	0
Other direct costs	300	0	0	2.000	0	0	0	3.400	5.700
Indirect costs/overheads	1.124	788	1.062	4.083	158	0	467	1.260	8.940
TOTAL COSTS	17.174	12.038	16.237	62.408	2.408	0	7.133	19.260	136.657

Table 2.3: Eligible costs for IUSS

Cost category	Task A	Task B	Task C	Task D	Task E	Task F	Task G	Task H	Total €
Personnel	6.750	1.575	24.345	9.225	35.675	41.540	58.500	8.775	186.385
Travel and subsistence	4.400	2.000	2.000	6.000	1.500	0	0	9.500	25.400
Equipment	0	0	0	0	0	0	0	0	0
Sub-contracting/External assistance	0	0	0	0	0	0	0	0	0
Other direct costs	540	0	0	1.000	0	0	0	1.400	2.940
Indirect costs/overheads	818	250	1.844	1.136	2.602	2.908	4.095	1.377	15.031
TOTAL COSTS	12.508	3.825	28.189	17.361	39.777	44.448	62.595	21.052	229.756

Table 2.4: Eligible costs for EUCENTRE

Cost category	Task A	Task B	Task C	Task D	Task E	Task F	Task G	Task H	Total €
Personnel	11.361	47.896	6.312	3.342	0	67.203	100.000	13.366	249.480
Travel and subsistence	4.400	4.000	2.000	6.000	0	0	0	9.500	25.900
Equipment	0	0	0	0	0	0	0	0	0
Sub-contracting/External assistance	0	0	0	0	0	0	0	0	0
Other direct costs	810	0	0	1.000	0	0	0	3.400	5.210
Indirect costs/overheads	1.160	3.632	582	723	0	4.704	7.000	1.839	19.640
TOTAL COSTS	17.731	55.528	8.894	11.065	0	71.907	107.000	28.105	300.232

In order to carry out the activities, the beneficiaries will receive from the Coordinator (EUCENTRE) an amount of €102.493,00 (ANNU) and €172.317,00 (IUSS) as part of the requested EC contribution. The beneficiaries will contribute to the project with €34.164,33 (ANNU) and €57.439,00 (IUSS) from their own financial resources. As regards EUCENTRE, the amount of EC contribution requested are €225.174,00 and the Coordinator will contribute to the project with €75.058,00 from his own financial resources.

2.3 Work plan (D.A.3)

The activities have been organized during the 24 months of the project. Figure 2.1 shows the table with the activities, the deliverables for each month and their leaders. During the technical kick-off meeting, organised in Pavia on 25th of February 2015, Barbara Borzi, on behalf of the project coordinator Fabio Germagnoli, presented the project work plan to the participants.
This deliverable D.A.3 can be consulted and downloaded from the website www.sasparm2.com.

2.4 Meeting with the European Commission in Brussels (D.A.4)

On the 20th of January 2015 Barbara Borzi and Fabio Germagnoli of EUCENTRE took part in a meeting with the European Commission in Brussels. During the morning, the representatives of the European Commission presented technical aspects, administrative aspects, financial and legal issues, whilst in the afternoon Barbara Borzi delivered a talk about the SASPARM 2.0 project. Then, the responsible desk officer 1 (Elisabetta Bellocchi) and desk officer 2 (Roberto Schiliro) have been identified. They have been interacting with Barbara Borzi and Fabio Germagnoli asking questions and being very interested to the project activities. The minutes of the meeting are included in deliverable D.A.4.

2.5 The Project Managing Committee (PMC) meetings (D.A.5)

On the 25th of February 2015 in Pavia the technical kick-off meeting of SASPARM 2.0 was held. The participants were:

- Eucentre: Barbara Borzi, Fabio Germagnoli
- IUSS: Ricardo Monteiro, Alberto Monti, Benjamin Beccari, Kamal Ahmed
- ANNU: Jalal Al Dabbeek

The meeting followed the agenda sent to the participants and available on the website www.sasparm2.com. One member of the team of the leading institution presented each task in approximately 20 minutes. About Task B it was agreed that only the staff of ANNU will run the field investigation for the identification of the building stock, since the current political situation in Palestine does not allow a safe journey for the team members of EUCENTRE and IUSS, who have, on the other hand, supported the activities providing guidelines for the survey and reviewing in deep the activity of the walk down outcome. The draft of the meeting is included in the deliverable D.A.5.

The second project meeting is scheduled for the 17th and 18th of September, 2015, in Pavia.

2.6 Financial reports (D.A.6)

The following tables show the financial statements of the coordinator and the partners. Eucentre has spent about 23% of the total budget, while IUSS and ANNu 29% and 22%, respectively. The lower spending with regard to what was envisaged is due to the fact that some activities, such as the training courses have been moved to the following financial period. At the time being correcting

measures have been adopted in order to make sure all the project activities will be undertaken in the 2-years project.

Table 2.5: Financial Statement of EUCENTRE

Participant Cost Statement Summary

Name of participant reporting own costs:					
Part A: Eligible cost categories	**Rate %**	**€**	**Part B: Financing Plan**	**€**	**% of eligible costs**
Personnel		62,385.73	EC-contribution*	50,939.04	75.00%
Travel and subsistence		915.70	Contribution of the **Coordinating beneficiary****	16,979.68	25.00%
Equipment		0.00	Contribution of the **Associated Beneficiary** reporting own costs		0.00%
Sub-contracting / External assistance		0.00	Contribution of other associated beneficiary/ies	0.00	0.00%
Other direct costs		174.01	Other sources of funding	0.00	0.00%
Indirect costs / overheads	7.00%	4,443.28	Direct revenues	0.00	0.00%
TOTAL ELIGIBLE COSTS		67,918.72	**TOTAL**	67,918.72	
			* eligible costs x EC-funding rate OR maximum EC-contribution, whatever is lower! **reporting own costs or contributing to Associated Beneficiary's costs		
For information only					
Estimation of "in kind" contributions / costs not included in the budget (ineligible costs)		0.00			
VAT-status *(please tick appropriate box)*					
? The reported costs are without VAT.					
? VAT is not recoverable and is therefore included in the reported costs. (Proof of non-recoverability attached)					

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Table 2.6: Financial Statement of IUSS

Participant Cost Statement Summary

Name of participant reporting own costs:	Istituto Universitario di Studi Superiori (IUSS)

Part A: Eligible cost categories	**Rate %**	**€**	**Part B: Financing Plan**	**€**	**% of eligible costs**
Personnel		61,373.20	EC-contribution*	49,251.99	75.00%
Travel and subsistence		0.00	Contribution of the **Coordinating beneficiary****	0.00	0.00%
Equipment		0.00	Contribution of the **Associated Beneficiary** reporting own costs	16,417.33	25.00%
Sub-contracting / External assistance		0.00	Contribution of other associated beneficiary/ies	0.00	0.00%
Other direct costs		0.00	Other sources of funding	0.00	0.00%
Indirect costs / overheads	7.00%	4,296.12	Direct revenues	0.00	0.00%
TOTAL ELIGIBLE COSTS		65,669.32	**TOTAL**	65,669.32	

* eligible costs x EC-funding rate OR maximum EC-contribution, whatever is lower! **reporting own costs or contributing to Associated Beneficiary's costs

For information only	
Estimation of "in kind" contributions / costs not included in the budget (ineligible costs)	0.00

VAT-status *(please tick appropriate box)*

? The reported costs are without VAT.

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Table 2.7: Financial Statement of ANNU

Participant Cost Statement Summary

Name of participant reporting own costs:	An- Najah National University (NNU)

Part A: Eligible cost categories	**Rate %**	**€**	**Part B: Financing Plan**	**€**	**% of eligible costs**
Personnel		20,875.32	EC-contribution*	23,026.55	75.00%
Travel and subsistence		1,745.50	Contribution of the **Coordinating beneficiary****		0.00%
Equipment		6,072.69	Contribution of the **Associated Beneficiary** reporting own costs	7,675.52	25.00%
Sub-contracting / External assistance		0.00	Contribution of other associated beneficiary/ies	0.00	0.00%
Other direct costs		0.00	Other sources of funding	0.00	0.00%
Indirect costs / overheads	7.00%	2,008.55	Direct revenues	0.00	0.00%
TOTAL ELIGIBLE COSTS		30,702.06	**TOTAL**	30,702.06	

* eligible costs x EC-funding rate OR maximum EC-contribution, whatever is lower! **reporting own costs or contributing to Associated Beneficiary's costs

For information only	
Estimation of "in kind" contributions / costs not included in the budget (ineligible costs)	0.00

VAT-status *(please tick appropriate box)*

? The reported costs are without VAT.

? VAT is not recoverable and is therefore included in the reported costs. (Proof of non-recoverability attached)

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Task ID	Task Title	Start Date	End Date	Actions	Actions - participants	Deliverables	Deliverable - responsible
A	Management and Reporting to the Commission	1	24	A.1 - Overall legal and contractual management	ALL	Month 1 D.A.1: Grant agreement	EUC (Germagnoli)
						Month 1 D.A.2.: Consortium Agreement	EUC (Germagnoli)
						Month 1-24 D.A.4: Minutes of the 2 meetings with the European Commission in Brusselles	EUC (Borzi)
				A.2 - Overall financial and administrative management	ALL	Month 1-8-16-24 D.A.5: 4 PCM meetings	EUC (Borzi)
						Month 8-16-24 D.A.6: Financial reports (2 interim and 1 final)	EUC (Lombardi) + ALL
				A.3 - Technical work coordination and monitoring	ALL	Month 1 D.A.3: Work plan	EUC (Borzi) + ALL
						Month 8-16-24 D.A.7: Technical reports (2 interim and 1 final)	EUC (Borzi) + ALL
B	Collection of Vulnerability Data on Buildings	1	15	B.1 - Definition of forms to collect data on buildings vulnerability	ANNU, EUC, IUSS	Month 2 D.B.1: Report on the structural typologies identified during the field investigation and the study of existing projects	ANNU (Al Dabbeek)
						Month 6 D.B.2: Paper format of the seismic vulnerability forms for citizens and practitioners	EUC (Borzi)
				B.2 - Guidelines for the collection of data on vulnerability of buildings	ANNU, EUC	Month 8 D.B.3: Guidelines for the compilation of seismic vulnerability forms for citizens and practitioners	EUC (Borzi)
				B.3 - Implementation of an electronic version of the vulnerability data forms	EUC	Month 15 D.B.4: Electronic format of seismic vulnerability forms (e-forms) linked to the WBP	EUC (Pagano)
						Month 15 D.B.6: App for compiling the e-forms through smart phones and tablets	EUC (Pagano)
C	Prevention and mitigation of seismic vulnerability	6	15	C.1 - Identification of retrofit measures	IUSS, ANNU	Month 9 D.C.1: Report on retrofitting measures to mitigate the seismic vulnerability of buildings	IUSS (Monteiro/Ceresa)
						Month 12 D.C.2: Tool to link the vulnerability data with the corresponding retrofit measure	IUSS (Monteiro/Ceresa)
				C.2 - Training on design and implementation of retrofit measures	IUSS, ANNU, EUC	Month 15 D.C.3: Training course on retrofit measures for practitioners	IUSS (Monteiro/Ceresa)
						Month 15 D.C.4: Training course on retrofit measures for building contractors	IUSS (Monteiro/Ceresa)
D	Training for targeted groups	6	16	D.1 - Training for university students	IUSS, EUC, ANNU	Month 6 D.D.1: Training material and brochures for university students	IUSS (Monteiro/Ceresa)
				D.2 - Training for citizens	ANNU, IUSS	Month 8 D.D.4 Brochures, videos and multimedia material for citizens	ANNU (Al Dabbeek)
				D.3 - Training for practitioners	IUSS, ANNU, EUC	Month 7-9-16 D.D.3: Report on the surveys taken after the training courses	IUSS (Monteiro/Ceresa)
						Month 8 D.D.5: Training material and short targeted manuals for practitioners	IUSS (Monteiro/Ceresa)
				D.4 - Training for stakeholders	IUSS, ANNU, EUC	Month 6-15 D.D.2: Brochures, posters and leaflets for stakeholders and policy makers	ANNU (Al Dabbeek)
E	Development of guidelines for risk management policy considering the socio-economic impact	12	24	E.1 - Critical evaluation of existing tools and legal mechanisms to quantify seismic risk within private and public	IUSS, ANNU	Month 14 D.E.1: Minutes of the focus group meetings with stakeholders and risk policy experts	ANNU (Al Dabbeek)
				E.2 - Guidelines for modelling seismic related risk including impact on society	IUSS	Month 15 D.E.2: Report on the local responses to cope with seismic emergency	IUSS (Monti)
				E.3 - Retrofit measures to mitigate the social costs of earthquakes	IUSS	Month 20 D.E.3: Guidelines for insurance policies	IUSS (Monti)
				E.4 - Explicit best institutional practices and alternative answers to mitigate the social costs of earthquakes	IUSS		
F	Development and implementation of vulnerability models for the evaluation of seismic risk	6	14	F.1 - Development of the methodology	EUC, IUSS	Month 14 D.F.1: Report on the fragility curves for each structural typology that sub-classifies the building stock	EUC (Borzi)
				F.2 - Validation of the developed simplified models	EUC, IUSS	Month 14 D.F.2: Validation report of the implemented methodology	EUC (Borzi)
G	Development of the Web-Based Platform (WBP) for seismic risk mitigation	1	24	G.1 - WBP design	EUC, IUSS	Month 2 D.G.1: Software requirement specification	EUC (Borzi)
						Month 3 D.G.2: Report with software architecture	EUC (Borzi)
				G.2 - Integration of tools for performing seismic risk analyses	EUC, IUSS		
						Month 15 D.G.3: Beta version of WBP	EUC (Borzi)
				G.3 - WBP implementation	EUC, IUSS	Month 20 D.G.4: Version 1 of WBP	EUC (Borzi)
						Month 24 D.G.5: Plan to maintain WBP after the project lifetime	
H	Publicity	1	24	H.1 - Generation of a Dissemination and Results Exploitation Plan	ANNU, EUC, IUSS	Month 2 D.H.1 Dissemination and results exploitation plan	ANNU (Al Dabbeek)
						Month 22 D.H.6: Working group meeting	ANNU (Al Dabbeek)
				H.2 - Dissemination Workshops & reports	EUC, ANNU, IUSS	Month 24 D.H.10: A Layman's report on paper and in electronic format	ANNU (Al Dabbeek)
						Month 2 D.H.2: Project web portal on WBP web support	EUC (Borzi)
				H.3 - Managing project documents, media work and training material on WBP	EUC, IUSS, ANNU	Months 3-5-9-12-15-18-21-24 D-H.3: Public project documents and newsletters on project website	EUC (Borzi)
						Months 7,10,13,16,19,21 D.H.4 Training material and videos uploaded on web portal	EUC (Borzi)
				H.4 - Monitoring progress of dissemination and exploitation of joint scientific production results	ANNU, EUC, IUSS	Months 12-24 D.H.5: Scientific/technical papers submitted to journals/conferences	EUC (Borzi)
				H.5 - Support synergy with related projects	ANNU, EUC, IUSS		
						Month 23 D.H.7: Exploitation study	ANNU (Al Dabbeek)
				H.6 - Exploitation study	EUC, ANNU, IUSS	Month 24 D.H.8: Final conference	ANNU (Al Dabbeek)
						Month 24 D.H.9: Final dissemination report	ANNU (Al Dabbeek)

Figure 2.1: Activities and deliverables

3 COLLECTION OF VULNERABILITY DATA ON PALESTINIAN BUILDINGS (TASK B)

3.1 Identification of structural typologies (D.B.1)

The structural and architectural configuration of buildings is one of the main aspects to the determination of its vulnerability. In fact, the definition of a building typology is the first step for large scale vulnerability assessment. Once the building types have been identified, the seismic vulnerability of each type is assessed.

The building types that characterize the as-built in Nablus are:

- Reinforced concrete frame buildings;
- Shear wall buildings;
- Masonry Buildings;
- Buildings with soft storey.

3.1.1 Reinforced concrete frame buildings

This structural type of buildings is the most common in Nablus. It mainly consists of in-situ casted reinforced concrete slabs supported by reinforced concrete beams and columns. This type is mostly used for residential buildings with 2 to 3 bays in both directions and up to the heights of 15 floors. The partitions are generally made of hollow concrete blocks with 100 mm thickness. On the other hand, the exterior walls can be made of hollow concrete blocks with thickness of 150 to 200 mm or masonry walls formed by three layers, namely: hollow concrete blocks of 100 mm thickness, weak concrete layer of about 130 mm thickness, and stone layer of about 70 mm thickness (see Figure 3.1).

Figure 3.1: Cross section of exterior masonry wall

Together with the vertical structure, the type of slabs have an influence also on the buildings geometrical dimensions (slab span). The two used typologies of slabs are:

- **Ribbed slabs with hidden beams:** In this category, the slabs are typically designed and fabricated as either one-way or two-way ribbed slabs by proper arrangement of hollow concrete blocks. Each hollow block has 400 mm length, 200 mm width and thickness in the range of 140 mm to 320 mm. The rib width is generally in the range of 100 to 200 mm and typical depths of such slabs vary from 200 to 500 mm. The beams are usually made hidden within the thickness of the slab. Typically, interstorey height ranges between 3.0 to 3.5 m, and the width of the bays ranges from 4 to 6 meters in both directions. Figure 3.2 and Figure 3.3 show details of both systems.

Figure 3.2: One-way ribbed slab system

Figure 3.3: Two-way ribbed slab system

- **Solid slabs with drop beams:** In this kind of buildings, the slabs are made solid of typical thickness, ranging from 150 to 300 mm, supported on drop beams. The depth of the beams

may range from 400 to 800 mm. Such high depth of the beams allows for large spans for the slab panels, ranging from 6 to 8 m in both directions. The height of the floors may vary between 2.8 and 5 m. The slabs of this system can be made either one-way or two-way depending on the allowable spans. This kind of buildings is mainly used for car parking garages and commercial buildings.

3.1.2 Shear wall buildings

This kind of buildings is becoming more common in Nablus. Typically, such buildings range from 5 to 20 floors in height and accommodate 3 to 5 bays in each direction. Reinforced concrete walls of typical thickness of 250-300 mm are used to provide lateral and vertical support to the building. The building may also include interior reinforced concrete columns which participate in carrying the gravity loads but their participation in carrying the lateral load is small hence can be neglected. Figure 3.4 shows a plan of a building characterised by a shear wall system. The walls can be cladded with masonry stones thus giving the appearance of a masonry building as shown in Figure 3.5.

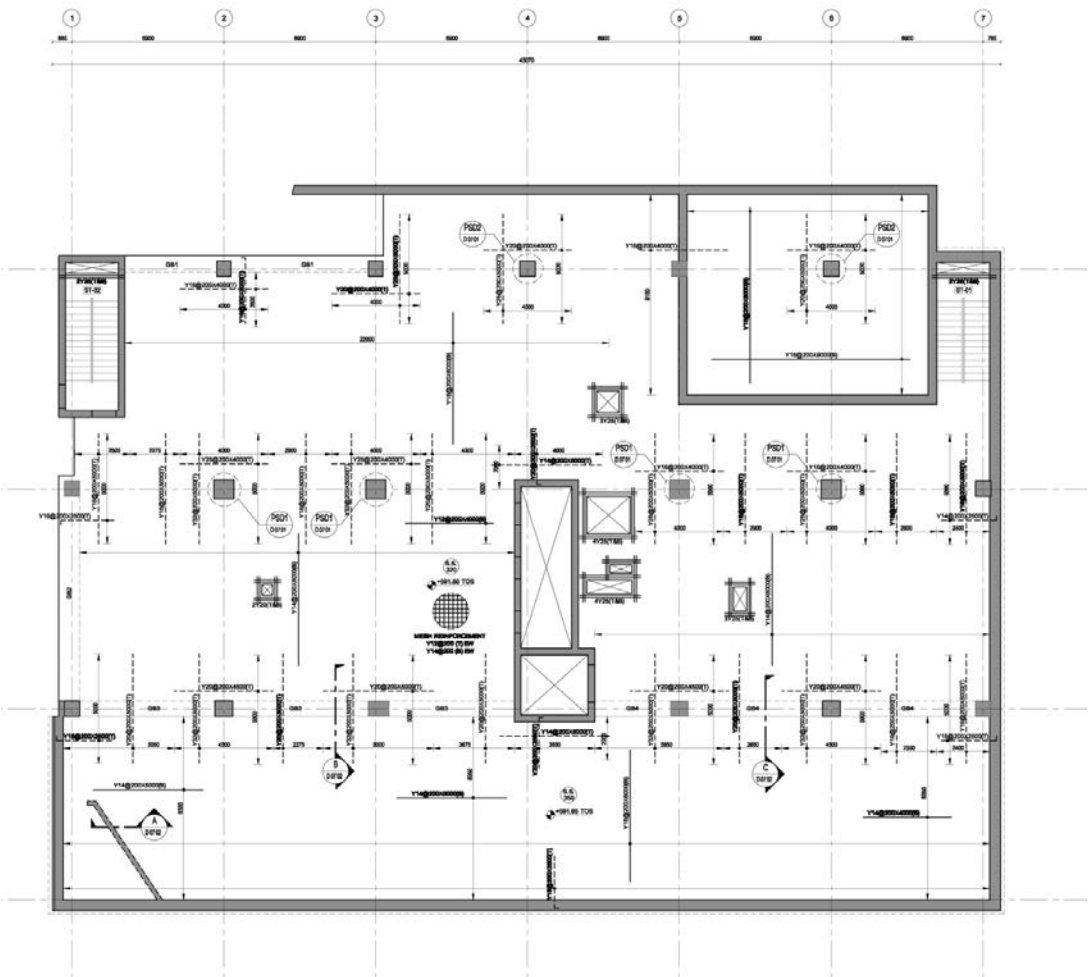


Figure 3.4: Plan view of a shear wall building with stone cladding

Figure 3.5: Stone cladding of shear wall building

3.1.3 Masonry buildings

Masonry buildings were a common structural type in Nablus up to the 1970. Masonry buildings comprise masonry walls that support reinforced concrete slabs. The masonry stones used in this type of construction are characterised by typical blocks of 250 mm height, 300-600 mm width and 150-200 mm thickness and are generally placed row-by-row to form the wall, which is the vertical structure that supports the concrete slabs. Buildings of this structural type generally have 1 or 2 bays in both directions with 2-3 floors in height. Furthermore, it is possible to have two different categories of wall, depending on the method of construction. In the first type, the wall is made of two surface layers of masonry stones with concrete filling in between; in this case, the thickness of the wall is around 400-500 mm (see Figure 3.6a). In the other type of wall, the masonry stones are installed row-by-row and then concrete is cast behind them via suitable framework, resulting in a wall with one-side masonry stones and the other side concrete surface (see Figure 3.6b).

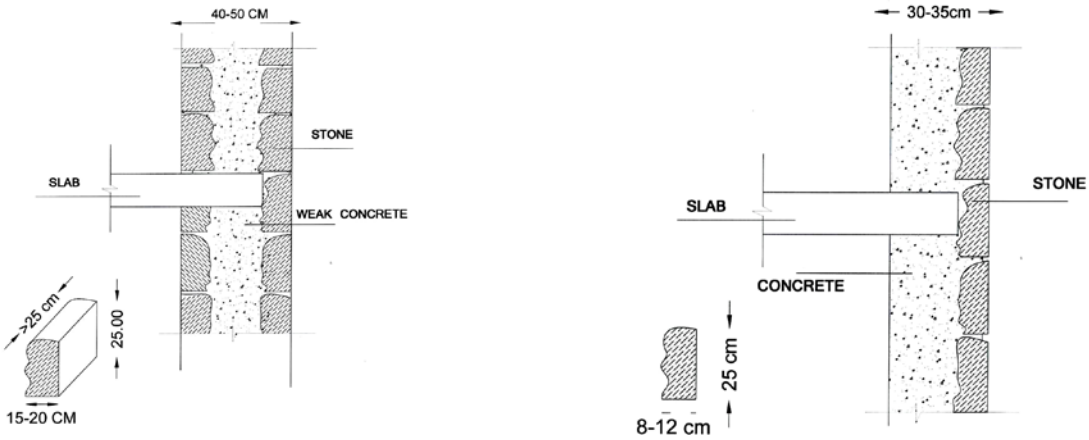
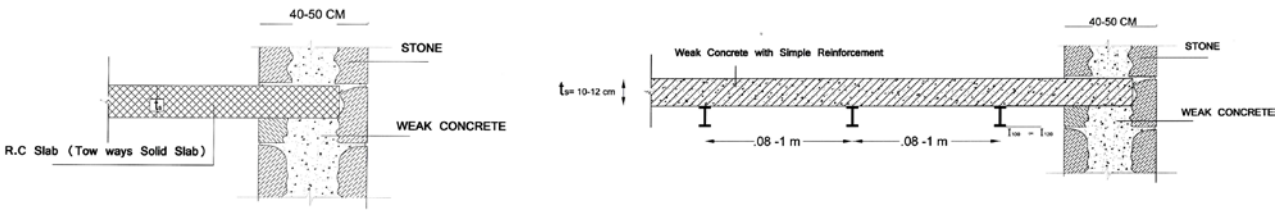


Figure 3.6: Sections of masonry building in which the wall is made of (a) concrete sandwiched between two surface layers of masonry stones and (b) one-side masonry stones and the other side concrete surface

Nowadays, concrete hollow blocks are generally used also as elements of permanent support for masonry walls. Such method results in a wall with concrete blocks on one side and masonry stones on the other side with concrete filling in between. Then, the wall can have a thickness of up to 350 mm.

When it comes to slabs, two kinds of slab construction are used. One type is two-way solid slabs with typical thickness around 200-250 mm (see Figure 3.7a). The second type is using steel joists as supporting beams for the solid slabs, thus resulting in composite steel-concrete construction for the slabs (see Figure 3.7b).



(a) (b)

Figure 3.7: Concrete slab in masonry buildings

The slabs in the composite floor construction are generally thinner (100-120 mm) with simple reinforcement. While in the first type slab spans might range from 4-5 meters, in the second type spans may range between 5-7 m in both directions. Figure 3.8, Figure 3.9 and Figure 3.10 show pictures of typical masonry wall buildings in Palestine.

Figure 3.8: A Three story masonry building

Figure 3.9: An old masonry building

Figure 3.10: A masonry building with the last story walls made of hollow concrete blocks

3.1.4 Buildings with soft story

This type of buildings comprises one of the shear wall system or the reinforced concrete frame system but with a soft story, due to missing infill walls everywhere or in part of the floor. The stiffness of the soft story is significantly smaller than the stiffness of other stories and irregular plan distribution of infill walls causes also eccentricity that further compromises the structural performance of the structure. Figure 3.11 and Figure 3.12 show partial and full soft stories in RC frame buildings.

Figure 3.11: A building with partial soft story

Figure 3.12: A building with full soft story

3.2 Forms for the collection of vulnerability data (D.B.2 and D.B.3)

The evaluation of the vulnerability is connected to the specification of the geometrical and structural features of buildings. For this purpose, it has been necessary to define paper forms in which it is possible to collect structural data of each building. Two different forms have been created: one, less detailed, for the citizens and the other, more detailed, to be used by groups of practitioners already trained during the first SASPARM project.

3.2.1 Form for the buildings – Citizens

This form has been created in a way that can be filled by anyone, also people that are not educated or that are not experts in engineering matters. It is divided in 4 sections defined by the shaded boxes. In some sections, the square boxes (❑) indicate the possibility of multiple answers, round boxes (○), instead, allow only a single choice. For boxes (|__|), it is necessary to write in block letters, starting from the left, if it is a text, or from the right, if they are numbers. Before writing down the characteristics of the building, the compiler has to write his/her name and educational level in block letters. If the compiler graduated, he has also to specify the faculty (Economics, Science, Engineering, etc.) and the department.The sections of the form are described below:

- **Identification of building**: In this section, the location and name of the building have to be filled in, together with the geographical coordinates of the main entrance. These coordinates have to be written in the *Lat.* and *Long.* boxes (WGS 84 System). Lastly, it is necessary to specify whether the building is isolated, internal, end, or corner (see Figure 3.13).

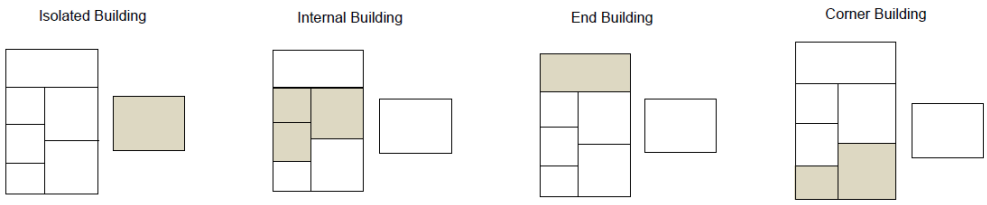


Figure 3.13: Examples of buildings

- **Description of the building:** In this section the total number of floors from the foundation to the attic has to be given; the latter has to be included only if it is usable. Also, the number of basements has to be specified. In *Age*, the compiler can choose a maximum of two options: the first is always the age of the building while the second is the possible year in which any actions were carried out on structure. In *Use*, multiple choices are possible: the types of uses coexisting in the building and the number of units for them. In *% of Use*, the current state of use has to be specified. Lastly, it has to be specified the number of occupants and the type of property.
- **Main material of building's vertical structure:** In this section, it has to be specified the material of the building, choosing between *reinforced concrete* and *masonry*. If the structure is made up of reinforced concrete, more details should be specified: if it is composed totally by walls or if there is partial or total absence of them (see Figure 3.14). In the latter case, it is necessary to specify the corresponding floors.

Building with no walls at one floor | **Building with some walls at one floor** | **Buiding with walls**

Figure 3.14: Examples of buildings made in reinforced concrete

- **Notes**: In this section, which is optional, some notes can be added, such as describing the building's features in more detail that cannot be captured in the other sections of the form.

In Figure 3.15 there is the full form for citizens.

GENERAL FORM FOR THE BUILDING
CITIZENS

Name of the compiler
Education level
Faculty
Department

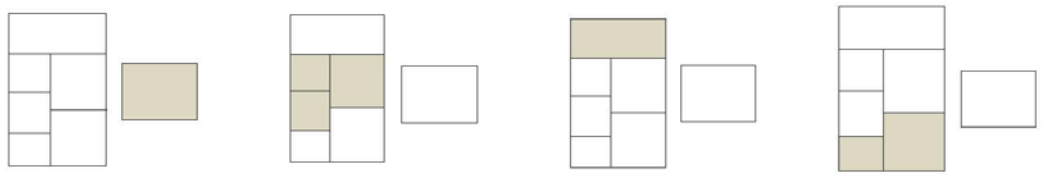
1) Identification of the Building

Municipality
Street name — Street number
Name of the building

Geographical Coordinates (WGS 84 System) — Lat. — Long.

Position of Building :

1 ❍ Isolated Building — 2 ❍ Internal Building — 3 ❍ End Building — 4 ❍ Corner Building



2) Description of the Building

N° of floors	Age	Use - Exposure				Property
N° Total floors with basement: ❍ 1 ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 ❍ 8 ❍ 9 ❍ 10 ❍ 11 ❍ ≥12 — N° Basements: ❍ 0 ❍ 1 ❍ 2 ❍ ≥3	Construction and renovation [max 2]: 1 ❑ ≤ 1919; 2 ❑ 19 ÷ 45; 3 ❑ 46 ÷ 61; 4 ❑ 62 ÷ 71; 5 ❑ 72 ÷ 81; 6 ❑ 82 ÷ 91; 7 ❑ 91 ÷ 02; 8 ❑ ≥ 2002	Type of Use: ❑ Housing ❑ Productive ❑ Trade ❑ Offices ❑ Public Service ❑ Deposit ❑ Strategic ❑ Touristic - Accomodation	N° Units of use	% of Use: A ❍ > 65% B ❍ 30÷65% C ❍ < 30% D ❍ Under Construction E ❍ Unfinished F ❍ Abandoned	Occupants (100 / 10 / 1): 0 0 0; 1 1 1; 2 2 2; 3 3 3; 4 4 4; 5 5 5; 6 6 6; 7 7 7; 8 8 8; 9 9 9	A ❍ Public B ❍ Private

3) Main Material of the Building's Vertical Structure

Masonry	Reinforced Concrete	If the building is in reinforced concrete:
❍ A	❍ B	B.1 ❑ The building has no walls at floor(s): ❑ 1 ❑ 2 ❑ 3 ❑ 4 ❑ 5 ❑ 6 ❑ 7 ❑ 8 ❑ 9 ❑ 10 ❑ 11 ❑ ≥12 — B.2 ❑ The building has partially walls at floor(s): ❑ 1 ❑ 2 ❑ 3 ❑ 4 ❑ 5 ❑ 6 ❑ 7 ❑ 8 ❑ 9 ❑ 10 ❑ 11 ❑ ≥12 — B.3 ❑ The building is composed totally by walls

Building with no walls at one floor	Building with some wall(s) at one floor	Building with walls
		

4) Notes

Date |__|__|__|__|/|__|__|/|__|__|	The Compiler (Block Letters) _____	Signature of the Compiler _____

Figure 3.15: Form for the citizens

3.2.2 Form for the buildings – Practitioners

This form has been created in the way that can be filled by practitioners. For this reason, it is more detailed than the form for citizens. The structure and the way of filling out of the form are the same of the one for citizens, with the exception of the number of sections that are 6:

- **Identification of building:** this section is equal to the one that is in the form for the citizens.
- **Description of the building:** This section is similar to the one that is in the form for the citizens. The only difference is that in *Metrics* the compiler has to indicate the height and the area of floor, which is the average along the height and areas of all the floors at each level.
- **Structural data**: In this section, the vertical and horizontal structures of the building are described. First, the compiler has to identify the material of the vertical structures of the building, choosing between *masonry* or *reinforced concrete*. If the structure is in reinforced concrete, more details should be specified: if it has RC shear walls, if it is composed totally by walls or if there is partial or total absence of them (see Figure 3.14). In the latter case, it is necessary to specify the corresponding floors. Then, the typology of the horizontal structure is described, choosing among *solid slab with drop beams*, *reinforced concrete ribbed slab*, *reinforced concrete slab* and *steel concrete* (see Figure 3.16). When it is not possible to understand the typology of the horizontal structure, one can select *not identified*.

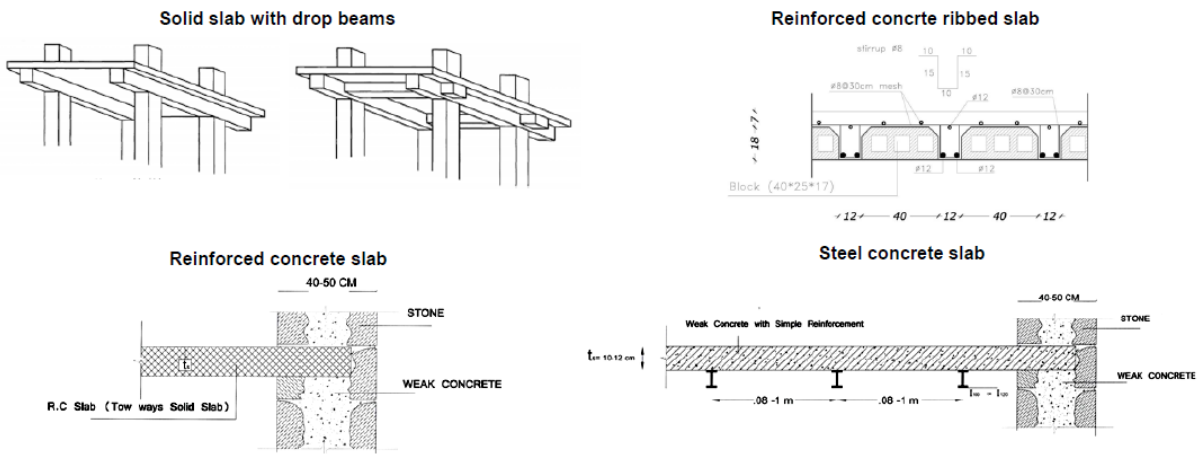


Figure 3.16: Example of horizontal structure

Finally, the typology of the roof has to be specified, choosing among: *heavy and flat*, *heavy and sloped*, *light and flat*, and *light and sloped*. The light roofs are those made of wood or steel, only if they have not heavy plates/tiles such as natural stone. Instead, heavy roofs are the ones made of reinforced concrete. The presence of slope defines the capability of the roof to transfer trusts to the perimeter walls. The presence of the water tank classifies, regardless to tipology, the roof as heavy.

- **Regularity**: In this section, the compiler has to indicate if the structure is regular in plan and in elevation. The criteria for the definition of the regularity in plan and in elevation are described at the paragraph 4.2.3 of UNI EN 1998-1:2005.
- **Geomorphological data:** In this section, the compiler has to specify the morphology of the site (*ridge*, *strong slope*, *slight slope*, *lowland*), possible landslides of the land on which there is the building or that might still involve the building itself, and the type of soil

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Project co-funded by ECHO - Humanitarian Aid and Civil Protection

foundation. The soil foundation can be classified as A, B, C, D, E, S1, and S2 (according to UNI EN 1998-1:2005) or S_A, S_B, S_C,S_D, S_E , and S_F (according to the Jordanian Building Code).

- **Notes:** In this section, which is optional, some notes can be added, such as describing the building's features in more detail that cannot be captured in the other sections of the form.

Figure 3.17 illustrates the full form for practitioners.

GENERAL FORM FOR THE BUILDING PRACTITIONERS

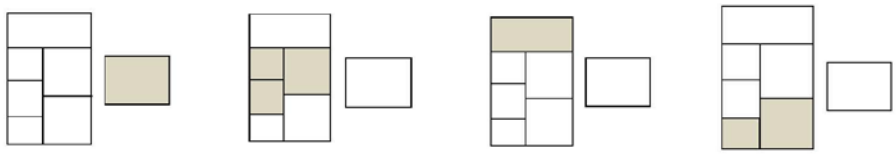
Name of the compiler
Education level

1) Identification of the Building

Municipality
Street name — Street number
Name of the building
Geographical Coordinates (WGS 84 System) — Lat. — Long.

Position of Buiding :

1 ❍ Isolated Building — 2 ❍ Internal Building — 3 ❍ End Building — 4 ❍ Corner Building



2) Description of the Building

Metrics			Age	Use - Exposure			
N° Total floors with basement	Average of floor height [m]	Average of floor area [m²]	Construction and renovation [max 2]	Type of Use	N° units of use	% of Use	Occupants
❍1 ❍9	1 ❍ < 2.50	A ❍ < 50 I ❍ 401 ÷500	1 ❑ ≤ 1919	❑ Housing		A ❍ > 65%	100 10 1
❍2 ❍10	2 ❍ 2.50÷3.50	B ❍ 51 ÷ 70 L ❍ 501 ÷650	2 ❑ 19 ÷ 45	❑ Productive		B ❍ 30÷65%	0 0 0
❍3 ❍11	3 ❍ 3.51÷5.0	C ❍ 71 ÷ 100 M ❍ 651 ÷900	3 ❑ 46 ÷ 61	❑ Trade		C ❍ < 30%	1 1 1
❍4 ❍12	4 ❍ > 5.0	D ❍ 101 ÷ 130 N ❍ 901 ÷1200	4 ❑ 62 ÷ 71	❑ Offices		D ❍ Under Construction	2 2 2
❍5 ❍>12		E ❍ 131 ÷ 170 O ❍ 1201 ÷1600	5 ❑ 72 ÷ 81	❑ Public Service		E ❍ Unfinished	3 3 3
❍6	N° Basements	F ❍ 171 ÷ 230 P ❍ 1601 ÷2200	6 ❑ 81 ÷ 91	❑ Deposit		F ❍ Abandoned	4 4 4
❍7	A ❍ 0 C ❍ 2	G ❍ 231 ÷ 300 Q ❍ 2201 ÷3000	7 ❑ 91 ÷ 02	❑ Strategic			5 5 5
❍8	B ❍ 1 D ❍ ≥3	H ❍ 301÷ 400 R ❍ > 3000	8 ❑ ≥ 2002	❑ Touristic - Accomodation			6 6 6
							7 7 7
							8 8 8
							9 9 9
					Property	A ❍ Public	B ❍ Private

3) Structural Data

Vertical Structure of the Building

Masonry	Reinforced Concrete	If the building is in reinforced concrete:	
❍ A	❍ B	B.1 ❑ The building has no walls at floors: ❑ 1 ❑ 2 ❑ 3 ❑ 4 ❑ 5 ❑ 6 ❑ 7 ❑ 8 ❑ 9 ❑ 10 ❑ 11 ❑ ≥12	B.2 ❑ The building has partially walls at floors: ❑ 1 ❑ 2 ❑ 3 ❑ 4 ❑ 5 ❑ 6 ❑ 7 ❑ 8 ❑ 9 ❑ 10 ❑ 11 ❑ ≥12
		B.3 ❑ The building is composed totally by walls	B.4 ❑ The building has RC shear walls

Horizontal Structure					Roof			
Not identified	Solid slab with drop beams	Reinforced concrete ribbed slab	Reinforced concrete slab	Steel concrete slab	Heavy and flat	Heavy and sloped	Light and flat	Light and sloped
❍	❑	❑	❑	❑	❍	❍	❍	❍

4) Regularity			
In plan		In elevation	
Regular	Not regular	Regular	Not regular
❍	❍	❍	❍

5) Geomorphological Data						
Morphology site				Landslides		Category of soil foundation
Ridge	Strong slope	Slight slope	Lowland	Absent	Existing	
❍	❍	❍	❍	❍	❍	|__|

6) Notes

Date |__|__|__|__|/|__|__|/|__|__|	**The Compiler** (Block Letters) _____	**Sign of the Compiler** _____

Figure 3.17: Form for the practitioners

4 TRAINING FOR TARGETED GROUPS (TASK D)

University students, citizens, practitioners and stakeholders are the main target groups to be trained within the activities of SASPARM 2.0.

The first training to be carried out is devoted to university students since they will play a key role in the project activities. During the training they will understand the content of the forms to be filled in by the citizens and the practitioners. After the course they will provide their feedback on the paper format of the forms and these will be improved on the basis of such suggestions, whenever feasible. After their training, university students will help the Consortium to train the citizens and the practitioners. They will also help the citizens to fill in the forms for collecting the vulnerability data on the Palestinian buildings. Furthermore, a selected group of these trained students will allow the generation of new Civil Defence Volunteers (CDVs). They will support the Consortium to spread the project outcomes to other Palestinian universities.

According to the Gantt chart of the project, the training for university students was initially planned to take place between months 6 and 7, i.e. June and July 2015. However, this period corresponds to the closing months of the academic year, when the students are overloaded due to their efforts to successfully pass the final examinations. For this reason, the Consortium members agreed to postpone the opening of the call, the selection and, therefore, the training for university students. These activities will start after the beginning of the new academic year and will be concluded by the end of the first project year. Such timing is perfectly in line with the foreseen date for the conclusion of the first version of the web-based platform (March 2016) in which the data collected by practitioners and citizens (during the period January-March) can be put.

At the same time, there will be the selection of the group of practitioners to be trained. The related courses will be organised immediately after those planned for the university students.

The training material and the questionnaires will be distributed during the courses and then uploaded on the project website.

Finally, the lessons and workshops for citizens are planned after the training for students and practitioners.

With respect to the training for stakeholders, Prof. Jalal Al-Dabbeek (ANNU) is organising several meetings with the local GO and NGO institutions. Some of these events are listed below:

- A workshop entitled “Future Vision and the consolidation of concepts” with the Palestinian National Team was organized on June 9 (2015) for developing a Disaster Risk Management System.
- Short training workshops for the Palestinian Relief Society’s staff and volunteers on disaster management and emergency response were organized in Ramallah and Bethlehem on August 25, in Hebron and Salfit on August 26, 2015.

The training material (e.g. posters, leaflets) distributed during these events will be uploaded on the project website.

5 DEVELOPMENT OF THE WEB-BASED PLATFORM (WBP) FOR SEISMIC RISK MITIGATION (TASK G)

5.1 Software requirement and architecture (D.G.1 & D.G.2)

It was produced a single document collecting the deliverables D.G.1 and D.G.2. This document shows the software requirement and the architecture of the Web-Based Platform (WBP) for seismic risk mitigation. The deliverable describes specifications for the development of the website and WebGIS platform of the project SASPARM 2.0. In fact, after an initial assessment, it was decided to develop the project's website and to create the link to the WBP.

The adopted architectural model is an evolution of WebGIS, known as “Spatial Data Infrastructure” (SDI), of which the system being developed by the partners of SASPARM 2.0 (the ones responsible for software development are EUCENTRE and IUSS) will represent a component. The main components that belong to this architecture have been identified as the Geo database, Map Engine, Web Services Standards, Web Map Viewers and Map Desktop Clients. The server selected is UMN MapServer. The entire system will be provided by a VMWare virtual architecture that is set up to scale transparently, both horizontally and vertically. The geographic information contained in the various geographic databases will become GIS products. The standards proposed by the “Open Geospatial Consortium” (OGC) have been chosen and adopted. The usable libraries selected are three: Open layers, MapFish and pMapper. It has been performed a research to identify the mechanisms and the formats usable to implement a feature that allows to notify changes or to update the geographic data. The two formats selected that will be implemented in the SASPARM 2.0 geographical portal are GeoRSS and GeoJSON. At last, the calculation routines available through the platform will be developed by programming codes, which are suitable to the engineering developments such as Fortran, C or Matlab.

6 PUBLICITY (TASK H)

6.1 Dissemination and results exploitation plan (D.H.1)

The deliverable D.H.1 presents the generation of a plan for dissemination and results exploitation. Dissemination and stakeholder engagement are fundamental for the successful outcome of the project. The overall objective is to identify and reach stakeholders, including end users and the general public, in order to raise their awareness regarding the findings of the project and to encourage them to support and adopt the recommendations and the resources that will result from the project. The project consortium has identified the categories that cover most of the stakeholders:

- Academic Community;
- Citizens;
- Practitioners;
- Decision & Policy Makers;
- NGOs.

For internal purposes, the dissemination strategy foresees that communication will be conducted via email, teleconferences and periodic face-to-face meetings. Shared documents are stored in Google Drive, giving all partners access at all times. The project website has both internal and external audiences in mind. The external objectives of the SASPARM 2.0 dissemination strategy are:

- to reach a wide audience of stakeholders, decision makers and special interest groups;
- to participate in presentations/conferences at national, European and international level;
- to publish articles/reports in journals, newsletters, newspapers, at national, European and international level to share project process/outcomes and examples of best practice in SASPARM 2.0.

Table 6.1 shows the timetable of the planned dissemination activities.

Table 6.1: Timetable of dissemination activities

Dissemination activity	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Dissemination strategy/reporting	■	■	■	■	■					■							■							■
Project website	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Flyers & posters	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Project conference																						■	■	■
Journal publications																						■	■	■
Policy papers																						■	■	■
Press releases	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Newsletter						■						■						■						■
Workshops				■				■				■				■				■				■
Presentations at external events and public meetings						■						■						■						■
Social networks	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Meetings and Personal communication	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

6.2 Project web portal on WBP web support (D.H.2)

As written in the proposal, a project website has been created and is online since the 12th of June 2015. Within this website, there will be a link to the Web-Based Platform (WBP) for seismic risk mitigation. In the website there are seven sections (Figure 6.1):

- About: short description of the project
- Work packages: list and description of the eight tasks
- Deliverables: right now you can view and download the deliverable D.A.3
- News: there is a list of meetings and events concerning the project
- Links: at the moment in this section there is only a link to the SASPARM website (developed in the previous project) but soon there will be also a link to the WBP for seismic risk mitigation
- Participants: short description of the partners and link to their website;
- Contacts: form to send an e-mail to the webmaster;
- SASPARM: this is the link to the SASPARM website (developed in the previous project).

The website was created with "WordPress" and it is available on smartphone too.

Figure 6.1: Homepage of the project website

6.3 Public project documents and newsletters on project website (D.H.3)

The first deliverable D.H.3 is the newsletter 1. This newsletter is an introduction to SASPARM 2.0 and is composed by three parts:

- Objectives of the project;
- Actions and means involved;
- Expected results.

The second newsletter will be released during the month of September 2015. It will be an advertisement of the project website and of the training courses for university students that will be organized. As previously explained, the delay in the organization of the course is related to the beginning of the next academic year to identify the applicant students.

6.4 Training material and videos uploaded on web portal (D.H.4)

The training material will be produced as soon as possible and uploaded to the project website. It will be:

- the Arabic version of the seismic vulnerability forms for citizens and practitioners;
- a photo gallery of the common building types on Palestinian territory.

When it will be possible to insert the data in the seismic vulnerability forms using the WBP, the photo gallery will be available to identify the different structural typologies.