

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

**Deliverable D.A.7**

**Final Technical Report**



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## 1 INTRODUCTION

After SASPARM FP7-Project ([www.sasparm.ps](http://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) worked 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 Palestine. The final product of the SASPARM 2.0 project has been the development of a web portal where different users (students/citizens/practitioners/GO and NGO stakeholders) can input and manage buildings structural data, collected through forms whose detail will increase in function of the level of knowledge of the compiler.

The work of SASPARM 2.0 was organized in 8 operative tasks, each of which had 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 Final Technical Deliverable (D.A.7) is composed of different chapters, each of which corresponds to a task activity carried out by the partners.





## 2 MANAGEMENT AND REPORTING TO THE COMMISSION (TASK A)

During the 24 months of the project, all the expected deliverables of this task were completed:

### 2.1 Deliverables

Deliverable	Name	When	Notes
D.A.1	Grant Agreement		Done at the beginning of the project.
D.A.2	Consortium Agreement		Done at the beginning of the project.
D.A.3	Work plan		Done at the beginning of the project.
D.A.4	Minutes of the 2 meetings with the European Commission in Bruxelles	<ul style="list-style-type: none"> <li>• 20th of January 2015</li> <li>• 1st of December 2016</li> </ul>	Done. The second meeting with the European Commission corresponded to the Final Conference in Brussels.
D.A.5	Four PCM meetings	<ul style="list-style-type: none"> <li>• 25th of February 2015</li> <li>• 17th and 18<sup>th</sup> of September 2015</li> <li>• 15th of April 2016</li> <li>• 13th of October 2016</li> </ul>	Done. All the PCM meetings took place in Pavia. In the last two PCM, the Nablus partner participated in Skype conference.
D.A.6	Financial reports	2 interim and 1 final	Done. The next paragraph reports the financial statements of EUC, IUSS and ANNU regarding the last period.
D.A.7	Technical reports	2 interim and 1 final	Done. There were two interim reports, one every eight months, whereas this document is the final technical report.

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### 2.2 Financial reports

The following tables show the financial statements of the coordinator and the partners. In this third reporting period, Eucentre has spent about 19% of its total budget, while IUSS and ANNU 36% and 40%, respectively. As a general comment to Table 2.1 and Table 2.2, it can be noted that the “Personnel” costs of Eucentre and IUSS were higher than the originally envisaged, whereas the “Travel and subsistence” costs were lower. This is mainly due to the critical political situation in Palestine during this reporting period. The unsafe situation of the country did not allow the personnel of both Eucentre and IUSS to travel to Palestine. Therefore, all the project activities were carried out without on-site visits, requiring more resources (i.e. person months) than originally envisaged.



Table 2.1: Financial Statement of EUCENTRE

Part A: Eligible cost categories	Rate %	€	Part B: Financing Plan	€	% of eligible costs
Personnel		285,573.80	EC-contribution*	234,122.29	75.00%
Travel and subsistence		4,346.78	Contribution of the <b>Coordinating beneficiary**</b>	78,040.76	25.00%
Equipment		0.00	Contribution of the <b>Associated Beneficiary</b> reporting own costs	0.00	0.00%
Sub-contracting / External assistance		0.00	Contribution of other associated beneficiary/ies	0.00	0.00%
Other direct costs		1,820.59	Other sources of funding	0.00	0.00%
Indirect costs / overheads	7.00%	20,421.88	Direct revenues	0.00	0.00%
<b>TOTAL ELIGIBLE COSTS</b>		<b>312,163.06</b>	<b>TOTAL</b>	<b>312,163.06</b>	

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Table 2.2: Financial Statement of IUSS

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		204,578.40	EC-contribution*	172,317.08	75.00%
Travel and subsistence		9,303.81	Contribution of the <b>Coordinating beneficiary**</b>	0.00	0.00%
Equipment		0.00	Contribution of the <b>Associated Beneficiary</b> reporting own costs	57,439.03	25.00%
Sub-contracting / External assistance		0.00	Contribution of other associated beneficiary/ies	0.00	0.00%
Other direct costs		843.13	Other sources of funding	0.00	0.00%
Indirect costs / overheads	7.00%	15,030.77	Direct revenues	0.00	0.00%
<b>TOTAL ELIGIBLE COSTS</b>		<b>229,756.11</b>	<b>TOTAL</b>	<b>229,756.11</b>	

Table 2.3: Financial Statement of ANNU

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		101,682.56	EC-contribution*	102,823.37	75.00%
Travel and subsistence		13,509.50	Contribution of the <b>Coordinating beneficiary**</b>		0.00%
Equipment		6,609.75	Contribution of the <b>Associated Beneficiary</b> reporting own costs	34,274.46	25.00%
Sub-contracting / External assistance		0.00	Contribution of other associated beneficiary/ies		0.00%
Other direct costs		6,327.00	Other sources of funding		0.00%
Indirect costs / overheads	7.00%	8,969.02	Direct revenues		0.00%
<b>TOTAL ELIGIBLE COSTS</b>		<b>137,097.83</b>	<b>TOTAL</b>	<b>137,097.83</b>	





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

During the 24 months of the project, all the expected deliverables of this task have been realized:

#### 3.1 Deliverables

Deliverable	Name	When	Notes
D.B.1	Report on the structural typologies identified during the field investigation and the study of existing projects		Done. The building types that characterize the built environment in Nablus are: <ul style="list-style-type: none"> <li>• Reinforce concrete frame buildings</li> <li>• Shear wall buildings</li> <li>• Masonry Buildings</li> <li>• Buildings with soft storey</li> </ul>
D.B.2	Paper format of the seismic vulnerability forms for citizens and practitioners		Done in English and in Arabic. These forms are downloadable from the WebGIS and from the project website.
D.B.3	Guidelines for the compilation of seismic vulnerability forms for citizens and practitioners		Done in English and in Arabic. These forms are downloadable from the WebGIS and from the project website.
D.B.4	Electronic format of seismic vulnerability forms (e-forms) linked to the WBP		Done in English. By the WebGIS the user can fill in the e-forms.
D.B.5	App for compiling the e-forms through smart phones and tablets		Done 2 Apps in English, one for citizens and the other for practitioners. The user can download the Apps from the WebGIS.





## 4 PREVENTION AND MITIGATION OF SEISMIC VULNERABILITY (TASK C)

During the 24 months of the project, all the expected deliverables of this task have been completed. The reports and the tool that were developed in this task represent an important piece of legacy that will be certainly useful to any future initiatives in the country, in terms of vulnerability reduction measures.

### 4.1 Deliverables

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Deliverable	Name	When	Notes
D.C.1	Report on retrofitting measures to mitigate the seismic vulnerability of buildings		Done. This report is accessible for download through the WebGIS platform. By reading this publication the user will get a perception of the spectrum of retrofitting measures that are available in general and for the context of Palestine.
D.C.2	Tool to link the vulnerability data with the corresponding retrofit measure		Done. This tool was implemented in the WebGIS platform so that by assessing each building typology's vulnerability, at least two retrofitting solutions would be proposed to reduce the vulnerability level. This element will be of fundamental importance for future retrofitting campaigns in the country.
D.C.3	Training course on retrofit measures for practitioners	• 25 <sup>th</sup> of May 2016	Done. The number of participants at this course was 27. The focus of the training was mostly to get the practitioners familiar with retrofitting techniques and on how to identify the best ones, depending on the building typology being considered.
D.C.4	Training course on retrofit measures for building contractors	• 24 <sup>th</sup> and 25 <sup>th</sup> of May 2016	Done. The number of participants at this course is 23. The focus of the training was mostly to create a culture of seismic performance among the building contract community, indicating a number of simple construction measures that can help to improve greatly the performance of the buildings under dynamic horizontal loads.





## 5 TRAINING FOR TARGETED GROUPS (TASK D)

During the 24 months of the project, all the expected deliverables of this task have been completed. The dates of the training sessions were slightly different from the ones initially foreseen to accommodate the availability of all the instructors and attendees, as well as cultural and religious constraints. Still, all the events were held with high participation rates and very good final feedback.

### 5.1 Deliverables

Deliverable	Name	When	Notes
D.D.1	Training material and brochures for university students	<ul style="list-style-type: none"> <li>• 4<sup>th</sup> of November 2015 Training course about the compilation of the vulnerability forms</li> <li>• 29<sup>th</sup> of May 2016 Training course about the seismic design of buildings</li> <li>• 26<sup>th</sup> of May 2016 Training course on retrofit measures for practitioners</li> </ul>	<p>Done.</p> <p>Three courses for university students were held and a flyer was prepared and distributed. The presentations and the flyer are available on the project website and can be used by the Palestinian partner in future training initiatives and risk mitigation awareness raising events.</p>
D.D.2	Brochures, posters and leaflets for stakeholders and policy makers	<ul style="list-style-type: none"> <li>• 24<sup>th</sup> of March 2016 A Workshop Conducted on “Disaster Risk Reduction in Palestine: Palestine Safe City Standards and the 10 Essentials for Making Cities Resilient” - Sendai Framework, Tulkarem</li> <li>• 2<sup>nd</sup> of February 2016 Meeting with stakeholders at Nablus Municipality, Nablus</li> <li>• 7<sup>th</sup> of April 2015 "Development of Disaster Risk Management Program in Palestine", Palestinian Red Crescent</li> <li>• 9<sup>th</sup> of June 2015 Workshop "National Team of Develop Disaster Risk Management System", Ramallah</li> </ul>	<p>Done.</p> <p>Within this deliverable, the following documents have been produced:</p> <ul style="list-style-type: none"> <li>• 1 flyer</li> <li>• 1 poster</li> <li>• 1 brochure</li> <li>• the document entitled “Seismic Performance and Building Configuration (Conceptual Design)”</li> <li>• the presentations used during the meetings listed in this table.</li> </ul> <p>These documents are available on the project website.</p>
D.D.3	Report on the surveys taken after the training courses		<p>Done.</p> <p>This report is related to the following courses:</p> <ul style="list-style-type: none"> <li>• 4<sup>th</sup> and 5<sup>th</sup> November 2015 (training courses have been assessed as: “good” - 48%, “very good” - 30%)</li> <li>• May 24-25, 2016 for practitioners and building</li> </ul>

			<p>contractors (training course have been assessed as: “very good” - 59%, “good” - 33%)</p> <p>This document is available on the project website.</p>
D.D.4	Brochures, videos and multimedia material for citizens	During the course held on 4 <sup>th</sup> of November, 2015 the vulnerability form for citizens was illustrated to university students	<p>Done.</p> <p>The following presentations are included in this deliverable:</p> <ul style="list-style-type: none"> <li>• Risk assessment mitigation</li> <li>• Vulnerability form for citizens</li> <li>• Guidelines for the forms</li> <li>• Example on the compilation of forms for existing buildings</li> <li>• 1 flyer</li> </ul> <p>These documents are available on the project website.</p>
D.D.5	Training material and short targeted manuals for practitioners	<ul style="list-style-type: none"> <li>• 5<sup>th</sup> of November 2015 Training course about the compilation of the vulnerability forms</li> </ul>	<p>Done.</p> <p>The following presentations are included in this deliverable:</p> <ul style="list-style-type: none"> <li>• Presentation of the project</li> <li>• Taxonomy of the existing buildings</li> <li>• Vulnerability models for the existing buildings</li> <li>• Vulnerability form for practitioners</li> <li>• Guidelines for the forms</li> <li>• Example on the compilation of forms for existing buildings</li> <li>• Italian seismic risk maps</li> <li>• Risk assessment mitigation</li> <li>• 1 flyer</li> </ul> <p>These documents are available on the project website.</p>



## 6 DEVELOPMENT OF GUIDELINES FOR RISK MANAGEMENT POLICY CONSIDERING THE SOCIO-ECONOMIC IMPACT (TASK E)

During the 24 months of the project, all the expected deliverables of this task have been completed. This task can be seen as ground-breaking, given that no well-established legal framework exists in Palestine to cope with natural hazards and extreme event consequences. As such, the deliverables D.E.2 and D.E.3 will surely represent a starting point for the future development of mechanisms of this sort.

### 6.1 Deliverables

Deliverable	Name	When	Notes
D.E.1	Minutes of the focus group meetings with stakeholders and risk policy experts	<ul style="list-style-type: none"> <li>• 25<sup>th</sup> of February 2016 Al Bireh – 11 participants</li> <li>• 1<sup>st</sup> March 2016 Ramallah – 1 participant</li> <li>• 3<sup>rd</sup> of March 2016 Nablus – 2 participants</li> <li>• 3<sup>rd</sup> of March 2016 Nablus – 1 participant</li> <li>• 6<sup>th</sup> of March 2016 Nablus – 4 participants</li> <li>• 8<sup>th</sup> of March 2016 Ramallah – 2 participants</li> <li>• 10<sup>th</sup> of March 2016 Ramallah – 6 participants</li> <li>• 7<sup>th</sup> of April 2016 Ramallah – 13 participants</li> <li>• 20<sup>th</sup> of April 2016 Nablus/Ramallah via Skype – 1 participant</li> </ul>	Done. The deliverable illustrates the meetings listed in this table.
D.E.2	Report on the local responses to cope with seismic emergency		Done. This report collects the current state-of-the-art in Palestine concerning the available tools for local response to seismic events. A disaster risk management framework is also proposed.
D.E.3	Guidelines for insurance policies		Done. Given the non-existence of such framework, this document provides guidelines, based on good practice and lessons learned from other countries, to establish earthquake insurance coverage.





## 7 DEVELOPMENT AND IMPLEMENTATION OF VULNERABILITY MODELS FOR THE EVALUATION OF SEISMIC RISK (TASK F)

During the 24 months of the project, all the expected deliverables of this task have been realized:

### 7.1 Deliverables

Deliverable	Name	When	Notes
D.F.1	Report on the fragility curves for each structural typology that sub-classifies the building stock		<p>Done.</p> <p>The fragility curves were obtained by adapting the SP-BELA methodology to typical buildings in Nablus. We have obtained fragility curves for 5 levels of damage and for 3 structural typologies:</p> <ul style="list-style-type: none"> <li>• Reinforce concrete frame buildings</li> <li>• Reinforce concrete frame buildings with soft storey</li> <li>• Shear wall buildings</li> <li>• Masonry Buildings</li> </ul> <p>For the buildings affected by the irregularities refer to the deliverable D.F.2.</p>
D.F.2	Validation report of the implemented methodology		<p>Done.</p> <p>For irregular RC frame buildings, the simplified-pushover based SP-BELA methodology illustrated in D.F.1 cannot take into account the torsional modes. This problem was analysed in D.F.2 in which two irregular RC prototype buildings are considered as examples.</p>





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

During the 24 months of the project, all the expected deliverables of this task have been realized:

### 8.1 Deliverables

Deliverable	Name	When	Notes
D.G.1	Software requirement specification		Done. We have made a unique report for D.G.1 and D.G.2 called "Software Requirements and Architecture".
D.G.2	Report with software architecture		Done. We have made a unique report for D.G.1 and D.G.2 called "Software Requirements and Architecture".
D.G.3	Beta version of WBP	<ul style="list-style-type: none"> <li>• 1<sup>st</sup> of March 2016</li> </ul>	Done
D.G.4	Version 1 of WBP	<ul style="list-style-type: none"> <li>• 18<sup>th</sup> of May 2016</li> </ul>	Done. This version is still functioning today and is installed in a server in Nablus.
D.G.5	Plan to maintain WBP after the project lifetime		Done. There are three requirements to maintain the WebGIS platform: <ul style="list-style-type: none"> <li>• Software updates</li> <li>• Backup of WebGIS application</li> <li>• Backup of the database</li> </ul>



## 9 PUBLICITY (TASK H)

During the 24 months of the project, all the expected deliverables of this task have been realized:

### 9.1 Deliverables

Deliverable	Name	When	Notes
D.H.1	Dissemination and results exploitation plan		Done. This document is available on the project website.
D.H.2	Project web portal on WBP web support		Done. The project website is continuously updated. <a href="http://www.sasparm2.com">www.sasparm2.com</a>
D.H.3	Public project documents and newsletters on project website		Done. 8 newsletters about the project were published during the 24 months of work. In the project website, there are all the relevant documents of the project, the deliverables, the presentations used during the courses together with the meeting, flyers and brochures.
D.H.4	Training material and videos uploaded on web portal		Done. In the project website, in the “Results” section, one can find and download all the dissemination material of the project.
D.H.5	Scientific/technical papers submitted to journals/conferences		Done. This deliverable shows the abstracts of papers presented at conferences and workshops.
D.H.6	Working group meeting	<ul style="list-style-type: none"> <li>• 22<sup>nd</sup> of November 2016</li> </ul>	Done. The Working group meeting had as topic “Guidelines for Risk Management Policy”. It took place in Nablus in skype connection with Pavia. In the morning, there were presentations of the project partners and in the afternoon a round table with the stakeholders.
D.H.7	Exploitation study		Done. This document is available on the project website.
D.H.8	Final conference	<ul style="list-style-type: none"> <li>• 1<sup>st</sup> of December 2016 in Brussels</li> </ul>	Done. In the website, there is the conference agenda.
D.H.9	Final dissemination report		Done. This document is available on the project website.
D.H.10	A Layman’s report on paper and in electronic format		Done. This document is available on the project website.

