



2. Expected Results

2.1 Expected impact on target groups

(a) the situation of final beneficiaries

The fact that Italy is a seismic risk country is well known. In the last 1,000 years there have been at least 20,000 seismic events larger than the three degrees of the Mercalli MCS scale in Italy. Of these, at least 200 earthquakes can be classified as disastrous and more than half took place in the south peninsula and in Sicily; approximately a third of seismic disasters were in the central Italy and remaining in the north. On the other hand, there were 496 earthquakes in Zagreb since 1880 (earthquakes above 3 points of Richter scale).

The earthquakes, therefore, had significantly conditioned history of the country even if, occurring at a distance of several generations in same area, very rarely they have stratified that "sub-culture from disaster" or "seismic folklore" that is diffused, as an example, in areas like Japan or China. A similar situation is in the oriental Adriatic countries. For both the Adriatic sides, the greater part of the building patrimony is often lacking in quality, realized in urgency, with poor materials, without following elementary technical norms and specifically not following anti-seismic rules. Talking about Italy, in last one hundred years, areas considered as seismic hazardous were considered as such only after an destructive earthquake. The situation changed with Bill PCM 3274 of March 2003 where it has been adopted a new seismic classification of the national territory. Some areas not previously classified as areas under seismic risk, were referred as seismic zones in new classification.

Viewing that picture, it is clear that some cities and industrial areas previously considered as not subject to seismic hazard were designed following probably obsolete seismic codes or even without any horizontal loads but the wind. Unfortunately, similar, or even worst situation is in Croatia. Other zones of the country were subjected to a re-classification, with a consequent increase in the calculation of seismic action.

(b) the technical and management capacities of final beneficiaries and partners (where applicable)

Italy and Croatia, therefore, have common problem to realize new constructions following the most modern criteria of seismic engineering, many of them introduced with the recent codes, from the other the problem of qualifying the existing city and industrial areas.

The project **M.E.E.T.I.N.G** could be easily inserted in such framework, considering that is going to propose methodological aspects on the topic of evaluation and mitigation of the seismic risk. Obviously, the possibility to develop the examples in the selected areas will depend on the availability of the financial resources associated to the project that will allow us to estimate real conditions of seismic hazard on the physical environment and constructed patrimony, of course, after proper investigation campaigns. Therefore, the success of the project should be evaluated in two ways:

1. how administrators will use the results produced from this research work.
2. will this research provide facts about hazards of possible seismic activity

The methodological aspects presented through the guidelines for the mitigation of the earthquakes effects as outcome of the project, will be on disposal for final users of the project results: - national and regional political authorities, the designers and the experts of seismic engineering. The main border condition, therefore, will be relative to average technical abilities that are present both in Italy and Croatia. The practical-informative aspects will be privileged, trying, when possible, to keep up a reasonable equilibrium between rigor, on one side, with clarity and comprehension immediacy, from other side.

The readiness in applicability of the guidelines to other countries of Adriatic region will depend also on regional standards of local professional practice. If a region does not have specific codes or prescription for planning of urban and industrial systems in seismic areas, the reference guideline can be used as base to develop new applicable methodologies of seismic design, or recommendation that are valid in region. If a local authority, instead, updated seismic codes and consolidated seismic design methods, then the guidelines could be used in order to complete the design and analysis procedures.



In summary, the project will be developed in order to answer to the requirements of the public administrators and the practitioners to have an instrument guiding them in the implementation of measurement of seismic risk mitigation. The agencies managers of the territory will be able to find some benefits also from the application part of the project that will illustrate the intervention methodologies in some selected zones.

2.2 Publications and other outputs

The M.E.E.T.I.N.G. project itself requires realization of series of specific outputs for target groups, concerning important question of the seismic risk mitigation. Carried ahead mostly by university teachers, this project proposes conducting real research on seismic risk evaluation using quantitative methods, and introducing risk management to local authorities in Zagreb, Dubrovnik and Molise. Outputs of this research will be available to agencies and authorities of the whole region, showing a way to manage seismic hazard conducting testing and calculating all risks that derive from seismic occurrences.

The aspects related to the research will be disseminated naturally through communication canales and articles in proceedings of workshops and thematic conferences at national and international level for various technical-scientific fields that collaborate to realization of the project. Eventual innovative points will became topics in papers for the most relevant national and international specialist journals, once again specific for the various aspects that contribute to the definition of the seismic risk. It is possible also that conference or journal papers will appear giving account of the combined activities between more topics in the project and on the interaction between the several activities.

The service activity will be in some way summarized in the guidelines, which will constitute an operating instrument in order to realize intervention of reduction of the seismic risk for city areas and for the industrial regional districts. The service activity will be carried out also through the planning of example cases of mitigation of the risk in selected areas.

As a consequence of this twofold nature of the project, in between from service to research activity, it is expected to employ totality of required financial resources with the aim to develop at our best all the activities of the project. It is reasonable that a number of local authorities will be interested at results of the project, not only in Italy and Croatia, but also in the other Adriatic countries where the solution seismic problems and the projects sustainable development of the territory becomes a priority and an instrument to improve the standards of life quality of the population.

A presentation on research results, along with guidelines for future activities and measures of interventions in legislative and building codes will be disseminated in cities of Molise and in Dubrovnik, as final activity of the project.

2.3 Multiplier effects

The M.E.E.T.I.N.G. project would have to be a step towards a general plan of seismic zonation and sustainable development of the Adriatic region, based on knowledge, research and technical-scientific progress. The plan should be aimed at the widest convergence of the technical-scientific resources gathered for sharing of methodologies, know-how, instruments of monitoring and analysis, setting up of technologies for prevention from natural hazards.

In this frame, the goals of our project are calibrated reasonably, to affect both sides of Adriatic sea. In fact, among final objectives of the project there is the dissemination of knowledge (in both the technical and the administrative area), the dissemination of technical information in the seismology, geology and geotechnical, structural and system engineering, the writing of guidelines containing the technical protocols, to be transferred to designers and industry owner.

It is obvious that seismic risk mitigation can be assumed as building "maintenance" of extraordinary type, revitalizing world of the constructions, with a variety of positive effects on the economy of the concerned areas ranging from insurance agencies to construction companies. Let us not forget,



seismic zonation and research is also very important concerning large infrastructural projects conducted by governments, for instance sewage treatment plants, bridges and roads where all hazards have to be accounted for.

It is why its important to include the area of Termoli in this research because of its double nature as an important tourist location as well as an significant industrial regional district and place of several present and future transportation infrastructures. It is why its important to include Dubrovnik in research, not only for its historic heritage role, but for considering locations of future international road corridors, interventions in port of Dubrovnik, as well as planned bridge between land and Peljesac peninsula.

2.4 Short- and long-term impact

(a) The financial aspect (how will activities be financed when the grant ends?)

Short term

Capacities for conducting this Activity are in place, set at the universities of Italy and Croatia, but until this opportunity for financing research have presented itself, realization was fairly impossible. Introducing kick-off project between these institutions will set grounds for future joint projects where other opportunities for financing through EU funds will be investigated. It is necessary to stress out that there is fair amount of research activity on both Universities present, and it is considered as natural ingredient beside their teaching process. As matter of fact, the project continuation could be secured by including institutions from Montenegro since city of Dubrovnik shares its faith with cities on Montenegrin coast.

The activities planned for M.E.E.T.I.N.G. project will demand range of activities from study and research, and will be connected with the city areas and the industrial districts where testing will be conducted. An important aspect of the project is real possibility to establish profitable scientific interactions between the institutions involved in research, in connection with local authorities, engineering societies, and the industries.

The project, in medium term (2-5 years) can set sustainable grounds for creation of variety of small to medium enterprises that will provide necessary services concerning research activities and seismic zonation plans.

Long term

In long term (15-20 years), it is planned to conduct seismic zonation on national scales, enabling sustainable development, and construction design codes that will prevent future catastrophes. The idea exists for city of Zagreb (pop 950 000) and it should be financed by local authorities, but not before show case is done.

The impact of the project in socio-economic terms for the regions of the Adriatic sea, resides, above all, in the possibility to calibrate the hypotheses of intervention in relation to the resources available. In particular, the protocols of intervention on the city and industrial areas will allow, in function of the economic availabilities, to establish a priority list of objects where protection measures are applied.

Providing type and topic of research of M.E.E.T.I.N.G. project, and activities pursued to reach proposed goals, it will have not only positive results from the technical-scientific, but also from the financial and institutional point of view.

At the end of the research, it is probable, in fact, than further financing founds pivoted on the evaluation and the mitigation of the seismic risk can be obtained from public agencies and private companies. The protection from natural hazards is going to be more and more a topic of social priority, where modern societies put necessity to be protected from occurrences that endanger their safety and development. And, on the other hand, it is necessary that research does not stop with this project, and that countries of Adriatic area improve and upgrade their patrimony of knowledge, putting itself on the wake of countries progressed and developed on theme.



(b) Institutional level (Will structures allowing the activities to continue be in place at the end of the project? Will there be local "ownership" of action outcomes?)

Institutions involved in project will be in place at the end of the project. Local ownership of action outcomes will take place through research results that will apply directly to local territories. But nevertheless, research results will be disseminated to scientific circles as well as to public bodies assigned to mitigate seismic hazards.

(c) Policy level (What structural impact will the project have - e.g. will it lead to improved legislation, codes of conduct, management methods, etc?)

This project will seek to improve legislation both in Italy and Croatia concerning seismic hazard. The world of engineering design is a strongly restrictive world with codes, where normative corpus is evolving and upgrading as national and international researches progresses. In particular, on the topic of behaviour of structures under seismic load a strong burst towards to innovation and modernization of the codes happened just after October 2002 Molise earthquake. Moreover, some of the researchers being involved in the project have collaborated and still cooperate with working groups that are entrusted to prepare documents for pre-normative or normative document having a regional, national or even European extent.

Following this research, Croatian researchers will propose interventions in legislation and in building codes, especially after investigating liquefaction occurrences in Zagreb and Dubrovnik.