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XXI Congresso Nazionale CIRIAF

Sviluppo Sostenibile, Tutela dell'Ambiente e della Salute Umana

A list of dos and don'ts in view of the next earthquake in Italy

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Abstract: The paper compares the earthquakes that struck the northern region of Friuli in 1976 and the southern city of Aquila in 2009. The Friuli case is a success story, because the reconstruction identified the dispersed industrial sector as the economic and social engine of the damaged area and the reconstruction activity was focused on it. On the contrary, the Aquila case is a planning failure since there was no identification of the economic and social engine of that area. Reconstruction resources were wasted in costly housing projects built on green-field locations, thus adding urban sprawl which has severely hindered restoration plans of the community. This paper highlights the need for a short list of dos and don'ts about how to rebuild core urban areas hit by earthquakes, as a standard guidance beforehand the next natural disaster. There should be some agreed guidelines concerning how to plan the reconstruction in case of new earthquakes. While these guidelines need to be adapted on a case by case basis, it seems likely that any successful reconstruction plan will have to include the following factors: 1. direct involvement of local municipalities in the decision-making process; 2. swift identification of the social and economic engine of the destroyed urban area; 3. efficient management of the time factor in restoring the social and economic engine of the destroyed urban area; 4. strategic urban planning focused on long-term renaissance goals and on short-term milestones relevant to the local community; 5. stop future urban sprawl, mend past ones.

Keywords: threshold analysis, reconstruction, earthquakes, Friuli, Aquila, Udine, San Daniele del Friuli, strategic planning, Country Alliance-ECA, Italian Civil Protection Department-CPD.

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1.The day after any earthquake: first things first

The first activity to carry out after any earthquake is quite obviously to save as many human lives as possible. On this point, it is interesting a comparison between the Italian Civil Protection Department (CPD) and the California equivalent institution, the Earthquake Country Alliance (ECA).

1.1 The experiences of the Italian Civil Protection Department (CPD)

Let us see first the case of the CPD. As stated in its official web site, the Italian Civil Protection Department was set up under the Presidency of the Council of Ministers in 1982. Since then, the CPD has gained a quite relevant experience on this matter. Its official site, however, does not give practical advises on what to do after an earthquake. Under the key question "*Are You prepared?"* there is a list of important points that every citizen should become familiar with, but there are not practical dos and don'ts. The text explains that

"*The Italian territory is exposed to seismic risk, thus being prepared for an earthquake is fundamental. Safety depends mainly on the building where you live. If it is an ant-seismic building, it won't be subject to major damages and will protect you. Wherever you are in the moment of an earthquake, it is very important to keep calm and follow some simple rules of behavior.*" [1]

However, what follows this introductory note are not rules of behavior, but general things to know in advance of an earthquake, as it is summarized below in 8 points :

1. Italy is a seismic country

The text reminds that Italy had in its past almost 300 earthquakes with a magnitude higher than 5,5, that is a destructive energy like the earthquake which struck the city of Aquila in 2009. While Italy is as a whole a seismic country, historically the "*strongest earthquakes are focused in the following areas: Northern-Eastern Italy (Friuli Venezia Giulia and Veneto), Western Liguria, Northern Apennines (from Garfagnana to the Rimini area), and, above all, across the Central and Southern Apennines, in Calabria and Eastern Sicily.*"

2. What happens to a building?

This point describes how seismic tremors provoke oscillations which affect buildings in various ways. "*Today's buildings need to be built in compliance with seismic regulations*."

3. Will the next earthquake cause major damage?

The explanation of this point ends with "*The next earthquake can do great harm: this is way we need to be informed, make prevention and be ready for a possible earthquake*".

4. When will the next earthquake occur?

In sum, the answer is "*Nobody knows (…). We know, though, which are the most dangerous areas (…) being prepared is the best thing towards prevention and reduction of the earthquake consequences*".

5. Are the earthquake effects the same everywhere?

Here the explanation is basically: it depends on distance, type of soil, shape of buildings and location of buildings, with greater effects on cliffs and hill tops.

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6. How can the State help me?

The text refers that after the earthquake in the city of Aquila in 2009, the State launched a national plan for seismic prevention aiming at 3 objectives: 1. Identification of areas that amplify ground shaking; 2. construction works to reduces the seismic risks of public buildings; 3. subsidies for seismic improvements of private buildings.

The third object has been attained in July 2020 when the so called "superbonus 110%" was approved. It is a tax deduction of 110% of the cost of construction works on existing buildings, granted in a few cases including the reduction of two seismic risk classes of existing properties.

7. Where you live

Here the text reminds that the whole country is divided in zones with different levels (seismic classes) of dangerousness. The advice is to contact relevant public offices to obtain information on which regulations apply in each case.

8. Safety of your home

Under this point, the text reminds that it is important for every citizen to know if his home respects the prescribed seismic standards. The list ends with the following recommendation: "*You need to know when and how your house was built, on which type of soil, with which materials.*"

The 8 points summarized above, touch key elements of awareness on how to deal with seismic risks in the country, but do not give any practical advice on what to do in case an earthquake takes place. To get such practical advises, the text in the official site of CPD refers to a communication campaign entitled "Io non rischio" (I do not take risks) which has been promoted and realized by CPD with other institutions. Here are the practical advices given by this campaign:

"*In case of an earthquake - What to do during an earthquake*

If you are indoors

Find a shelter under a beam, in the doorway or by a load-bearing wall

Watch out for things that could fall and hit you (plaster, ceilings, windows, furniture, etc.)

Pay attention to the stairs: in general they are not very resistant and can be damaged

Avoid taking the lift: it can get stuck

If you are outdoors

Move away from buildings, trees, lampposts, power lines: you could be hit by vases, tiles and other materials that can fall

Pay attention to other possible consequences of the earthquake: collapse of bridges, landslides, gas leaks, etc.

What to do after an earthquake

Check the state of health of the people around you and, if necessary, be the First Aider

Come out with caution, wearing shoes: you may get hurt in the streets with broken glass

If you are in a zone exposed to tsunami risk, move away from the beach and reach a higher place

Limit, as much as possible, the use of the phone

Limit the use of the car to avoid obstructing the passage of emergency vehicles

Reach the waiting areas provided by the Local Emergency Plan " [2]

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1.2 The experience of the Earthquake Country Alliance (ECA)

Let us see now the case of ECA. The Earthquake Country Alliance (ECA) is a public-private-grassroots partnership of people, organizations, and regional alliances that work together to improve earthquake and tsunami preparedness, mitigation and resiliency.

ECA develops resources and organizes activities to help everyone who lives, works, or travels in earthquake country be prepared to survive and recover quickly. It is worth noticing that the logo of ECA reports the following claim "*We're all in this together*" which stresses the need for a sense of community to overcome any kind of natural disaster. The concept of being in the same community is a fundamental guiding principle on which any policy towards a recovery from a natural disaster like an earthquake should be based. I will retrieve and expand this concept later in the second part of this paper.

The ECA approach shows several common features with the one of CPD, but it is somewhat more practical. It seems a mix between the official site of CPD and the site of the communication campaign "I do not take risks", as it uses a direct language with most terms taken from everyday spoken English. Listed below is the full set of advices given by ECA to "*help everyone who lives, works, or travels in earthquake country be prepared to survive and recover quickly*". The list is entitled "Seven Steps to Earthquake Safety". The seven steps are grouped in 3 parts: prepare, survive and recover. The introduction to these steps is straightforward: ""*Before the next big earthquake we recommend these four steps that will make you, your family, or your workplace better prepared to survive and recover quickly*".

This concept is quite similar to what the CPD explains in its web site: while no one knows when the next earthquake will hit, there is no doubt that there will be one in the near future. In the Italian case, given the track record of the last 3 centuries and with a focus on the last 50 years, it seems very likely that there will be in the period 2020-2040 a major earthquake of magnitude similar to the earthquakes of Friuli 1976, Irpinia 1980 , Aquila 2009, Emilia-Romagna 2012 and Centre of Italy in 2016 and 2017 with focus in the Apennine areas of the regions of Abruzzo, Lazio, Marche e Umbria. The next new earthquake will hit urban centers in the areas subject to the highest seismic risk in the country, which are the following: Northern-Eastern Italy (the regions of Friuli Venezia Giulia and Veneto), Western Liguria, Northern Apennines (an vast horizontal area from Garfagnana to the Rimini province), and last but obviously not least the Central and Southern Apennines till the region Calabria and Eastern Sicily.

It is a fact that Italy is a seismic country, where in the past there have been some 3,000 earthquakes including about 300 seismic major events, that is earthquakes with a magnitude higher than 5.5. In this context, the widespread risk of a next major earthquake somewhere in the country is well portrayed by the well-known map of Seismic hazard model MPS04-S1 of the INGV (Italian Institute of Geophysics and Volcanology). This map shows, among other things, that most of the country is within a 10% probability of a major seismic event in the next 50 years, with the notable exception of what are now the largest cities of the country (Rome, Milan, Turin, Naples) which probably have become so precisely because of the lack of seismic activities in the past centuries.

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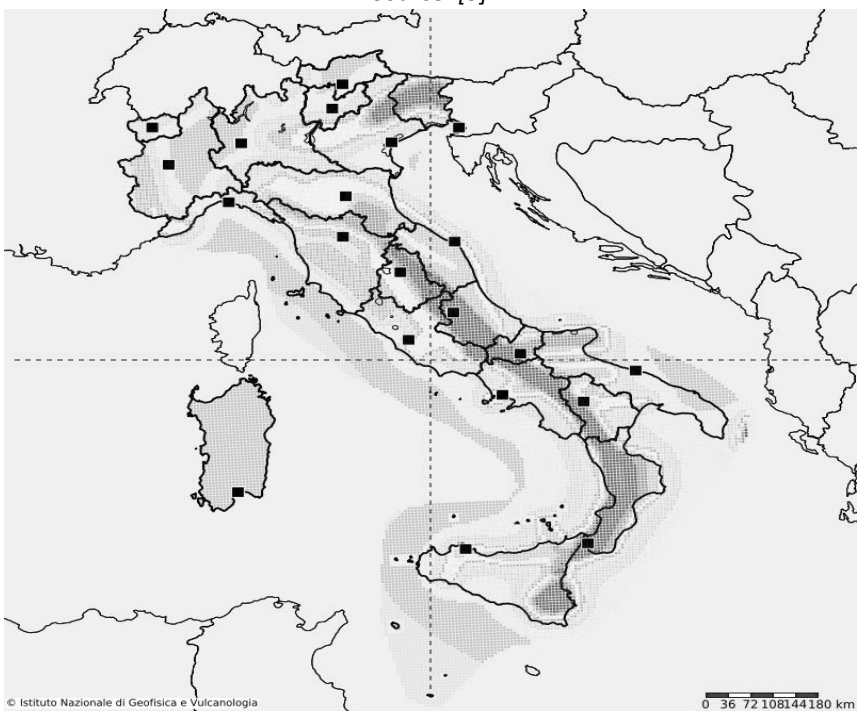
Figure 1. Seismic hazard model MPS04-S1 of the Italian Institute of Geophysics and Volcanology (INGV)

Source: [3]



Going back now to the ECA approach, the following are the seven recommendations made in in various languages (English, Spanish, Chinese) in the state of California, plus 10 regional versions, taken from the official documents of that institution.

1.2.1 ECA -Seven Steps to Earthquake Safety

Phase 1 Prepare

Before the next big earthquake we recommend these four steps that will make you, your family, or your workplace better prepared to survive and recover quickly:

Step 1:

Secure your space by identifying hazards and securing moveable items. This step is portrayed with a drawing of two people securing a bookshelf and water heater to prevent them from falling in an earthquake.

Step 2:

Plan to be safe by creating a disaster plan and deciding how you will communicate in an emergency. This step is portrayed with a drawing of a family discussing their emergency plan at a dining table.

Step 3:

Organize disaster supplies in convenient locations. This step is portrayed with a drawing of a parent and child organizing disaster supplies in a backpack and a larger container.

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Step 4:

Minimize financial hardship by organizing important documents, strengthening your property, and considering insurance.

Phase 2 and 3 Survive And Recover

During the next big earthquake, and immediately after, is when your level of preparedness will make a difference in how you and others survive and can respond to emergencies:

Step 5:

Drop, Cover, and Hold On when the earth shakes or you get an alert. This step is portrayed with a drawing of a family protecting themselves during an earthquake, under a table and in a wheelchair.

Step 6:

Improve safety after earthquakes by evacuating if necessary, helping the injured, and preventing further injuries or damage. This step is portrayed with a drawing of people after a quake cleaning up debris, helping the injured, and moving to high ground in case of tsunami.

After the immediate threat of the earthquake has passed, your level of preparedness will determine your quality of life in the weeks and months that follow:

Step 7:

Reconnect and Restore

Restore daily life by reconnecting with others, repairing damage, and rebuilding community. This step is portrayed with a drawing of people reconnecting with family, repairing a damaged window, and reopening a school [4].

Each one of the above-mentioned steps is described in ECA documents in details both in words, about one page text, and with even further details with links to videos of about one hour lenght each, available on YouTube as a webinar series produced by the same institution. Furthermore, ECA is very active within the state of California as a documentation center on earthquakes, tsunami and natural disasters. For example, members of ECA are available as speakers, on a voluntarily basis, for online events organized by local communities.

As the above show, the experience of Italian Civil Protection Department (CPD) and the experience of the American Earthquake Country Alliance (ECA) are quite similar in terms of recommendations to the respective residents on what to do before, during and after a major earthquake. It appears, in my view, that the down-to-earth approach of ECA is more effective than the somewhat academic style of CPD., but in it should also be noted that the language differences depend more from the cultural context of the two countries rather than from real differences in the core message. What is relevant, is that both institutions have seen the urgency to prepare well in advance from the next “big one” (earthquake) a list of recommendations directed to citizens as well as to policy-makers on the best behavior to minimize the damages connected to seismic risks. Other national institutions dedicated to manage natural disasters have prepared similar lists of dos and don’ts with the aim to be prepared on what to do in case of new earthquakes take place.

So if a list of dos and don’ts make sense to direct public action before, during and in the aftermath of an earthquake, we should push forward this public policy approach and focus on the reconstruction

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phase which should begin immediately after the search and rescue phase is over. The point that this paper tries to clarify is whether or not it is in the public interest to draw a list of dos and don'ts on how to go about the reconstruction phase. And in case the answer would be a positive one, what are the key elements which should be included in this list.

2. A comparison between the reconstruction plans after the earthquakes of Friuli 1976 and Aquila 2009.

As previously stated, Italy is a seismic country so there is plenty of earthquakes in recent decades to analyze. I propose here to focus on the seismic major events of Friuli 1976 and Aquila 2009 because they epitomize respectively success and failure in the literature concerning the analysis of planning tools applied to the reconstruction of urban areas hit by earthquakes. Before going into the details of each of the two cases, it is useful to remind that the claim under the logo of ECA- Earthquake Country Alliance reads as follows: "*We're all in this together*". This claim should be borne in mind, in my view, in the Italian scenario since Italy is the country of the bell towers, a collection of thousands municipalities whose origins date deep back in the past, so that claim reminds us that the concept of local community is the cornerstone of a successful reconstruction phase to overcome any kind of natural disaster.

Ultimately, what is the object of a successful reconstruction is the local community life, with all its tangible connections (i.e. roads, bridges, public spaces, water and gas pipelines, electric grids, communication networks etc.) and with all the complex interactions of non-measurable nature, first of all the link between home and work places, not to mention the links between home and retail and leisure areas. In sum, for a reconstruction activity to be remembered as a success in history books, it must reconnect and restore the community as a live entity. A reconstruction activity limited to the rebuilding of the fallen real estate properties without a community idea in mind, is bound to be a failure and produce a waste of public resources.

The earthquakes of Friuli 1976 and Aquila 2009 have been analyzed extensively so far, but a comparison between the two events has not yet been conducted. This task exceeds the scale of this paper too, and it would also be out of topic. The scope of the proposed comparison is to focus strictly on the few key elements that have played the major role in the final outcome of the reconstruction activities, and on this basis draw a list of dos and don'ts with the final goal to reconnect and restore community life. In short, the planning literature refers to the Friuli case as a success, while the case of Aquila is generally regarded a failure from the urban planning viewpoint.

2.1 The case of Friuli 1976

With reference to the concept outlined above, in the case of Friuli the local community forged the reconstruction phase as an opportunity to reconnect and restore the community. While doing this, the local community took also the earthquake as a chance to boost the economy and the self-esteem of residents by pretending from the central state the foundation of the University of Udine.

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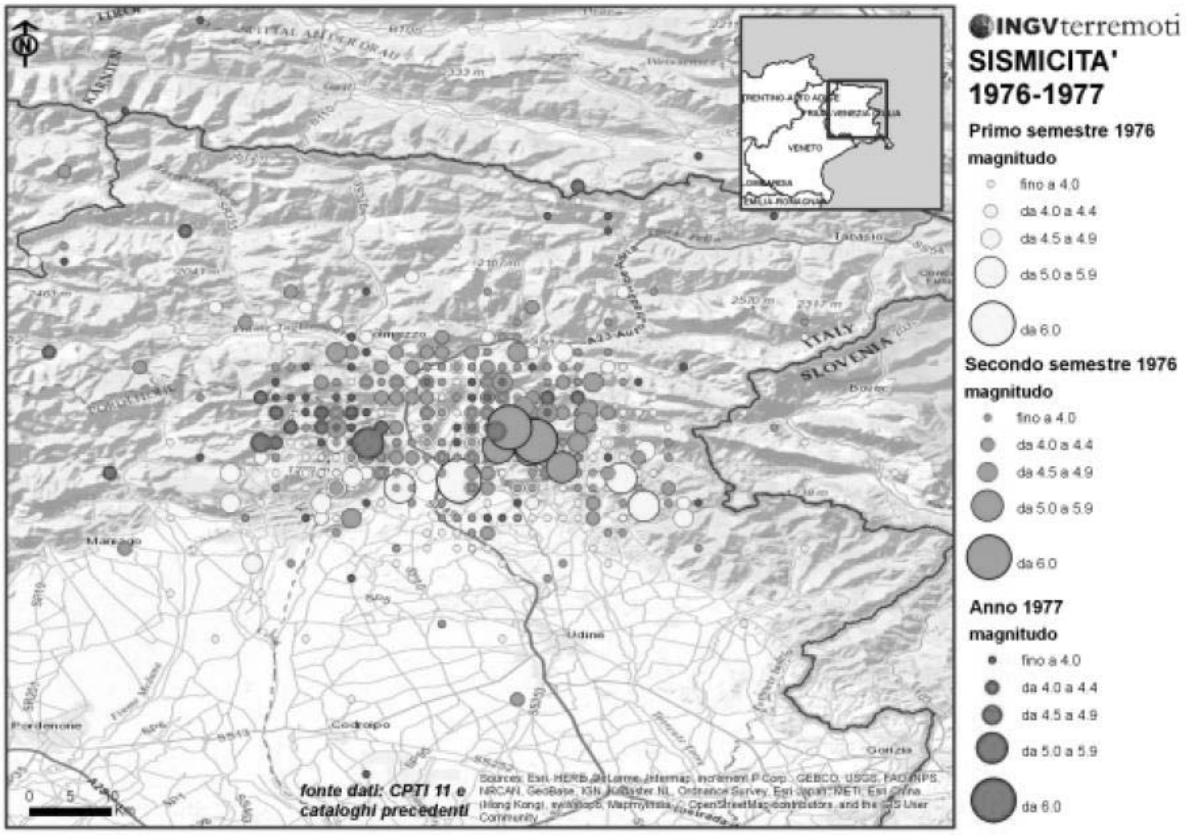
The Friuli earthquake hits a vast foothill strip north of the city of Udine for the first time on May 6, 1976 and a second time in September of the same year. The strong reaction of the local community, supported in an excellent way by the solidarity of the other Italian regions, led to the foundation of the University of Udine, which was inaugurated on 6 March 1978. In the short period of 2 years there is the end of an era and the beginning of a new phase of development, still in progress.

Figure 2. Friuli earthquakes magnitudes, 1976-1977



Source: [5]

The city of Udine, the capital of Friuli (north-east of Italy, on the border with Yugoslavia) had already started in the 1960s the project to have a public university institution, which it lacked. But it is only with the strong reaction to the 1976 earthquake that the project became concrete and was realized. In 1968 the Consortium was established for the establishment and development of university teaching in Udine (with the prefectural decree 27/11/1967 n. 6237). The effort continued in 1972 with the establishment of the Committee for the Friulian University which launched and implemented in 1976, amid a thousand difficulties including the earthquake, the decisive action of the popular initiative law proposal for the foundation of the University. The target of 50,000 signatures was exceeded, reaching over 125,000 signatures, "*many of which were collected in post-earthquake tent cities. In this way, the Friulian people showed their willingness to bet on their future starting from higher education, from knowledge, from young people* "[6].

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I mention these facts, which are now part of history and are well documented [6-7], because the success of the post-earthquake reconstruction of Friuli cannot be understood, if it is not seen as the rebirth of local community. A rebirth that was not limited to the physical reconstruction of the collapsed buildings, but which made the reconstruction of the collapsed buildings a tool for a strategic renewal project of the local community. It was a strategic project because it was oriented to the future, not to the past, and was aimed at building with the material and intangible resources made available after the earthquake, new job opportunities and cultural and social growth hitherto unknown in that land of emigration.

It has already been clarified [8] that in Italy there is only one other case in which the post-earthquake reconstruction led to the foundation of a university institution in a territory that until that moment was devoid of it. This is the University of Basilicata, established in the city of Potenza (in the Basilicata region, in southern Italy) in 1981, after the 1980 earthquake. Thanks to this new institution, Potenza has developed cultural activities and services that have had an positive also on the city of Matera and on the whole region. But it was with the 1976 earthquake in Friuli that for the first time the attempt was made to combine the physical reconstruction of a territory with the reconstruction of the economic and social relations of the local community.

It seems to me quite necessary to deepen, albeit briefly, the close connection between the post-earthquake reconstruction activity and the foundation of the University of Udine. The new official website of the University of Udine proudly so explains that crucial step in the reconstruction of the region after the earthquake of 1976:

"*The academic activity of the University of Udine began on November 1, 1978 and the establishment of the University of Friuli was desired, unique in the Italian panorama, by popular will.*

In 1976, after the devastating earthquake that struck Friuli, the population and local institutions mobilized to collect the necessary signatures (at least 50,000) for a popular initiative bill to ask for the birth of a university in Friuli. There were 125,000 signatures, many of which were collected in post-earthquake tent cities. In this way the Friulian people showed the will to bet on their future starting from high education, from knowledge, from young people.

Friuli obtained its own University through a regulation contained in the first organic law for the financing of post-earthquake reconstruction: article 26 of law 546 of 8 August 1977. The regulation was implemented on 6 March 1978 by decree of the President of the Republic no. 102, published in the Official Gazette no. 102 of April 13, 1978. This decree established and de facto initiated the University of Udine, as an institution aimed at "contributing to the civil, social and economic birth of Friuli and to become an organic tool for the development and renewal of originals of the culture, language, traditions and history of Friuli » [6].

The earthquake of Friuli 1976 caused over 900 casualties, compared to slightly more than 300 in the city of Aquila in 2009. Moreover, in Friuli the seismic shakes occurred in a vast portion of the region and lasted in a stop and go form for about one year.

The planning of the reconstruction phase took momentum in the second semester of 1977, in the aftermath of the kidnapping of the Italian prime minister Aldo Moro which occurred in march 1977. At

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the time there was no Civil Protection Department in Italy, so the search and rescue activities were done by the military, while the newly borne regional institutions established direct cooperation agreements with the Region Friuli Venezia Giulia and other institutions like municipalities and associations of municipalities like the Hill Community of Colloredo di Monte Albano whose main city is San Daniele del Friuli.

The numerous urban centers hit by the 1976 Friuli earthquake have been rebuilt as they were and where they were, starting from their respective historical centers. The anti-seismic regulations have been applied to all the damaged buildings that could be recovered. The new buildings were built according to measures exceeding the minimum requirements imposed by the anti-seismic legislation. From the viewpoint of urban and regional planning, it is important to note that the reconstruction plans aimed at avoiding any form of urban sprawl. Modern duplicates of the destroyed centers were not built, and there was the foresight to avoid building on agricultural land. Greenfield projects were the exception, not the rule. This happened in the municipalities of Tolmezzo, San Daniele, Gemona, and in a hundred other municipalities in Friuli.

The best example of how the reconstruction was conducted in Friuli is the case of the Hill Community of Colloredo di Monte Albano (HCC). At the time it included a dozen municipalities (including: Buja, Colloredo di Monte Albano, Fagagna, Majano, Moruzzo, Osoppo, Ragogna, San Daniele del Friuli, San Vito di Fagagna, Treppo Grande) and today it still exists with the denomination of Hill Community of Friuli (Comunità Collinare del Friuli) and a larger number of adherents. The reconstruction plan was studied very quickly (12 months) thanks to a collaboration between HCC and the Piedmont Region which sent a multidisciplinary group from the Polytechnic of Turin and the University of Turin to the site for a year.

I was part of this group from the beginning, and I contributed to the study of the “Threshold Analysis” and its possible application to the reconstruction plan of San Daniele del Friuli and the other municipalities of the HCC [9]. Based on the planning analysis of that part of the region Friuli, it became evident to us that the threshold theory could give a useful direction to post-earthquake reconstruction, even if it had not been developed for this purpose. The threshold analysis takes its first steps in the second post-war period in Poland and arises from the need to efficiently plan post-war reconstruction. The method of analysis is interdisciplinary, with an important role given to economic analysis. The method was formalized in the 1960s [10] and subsequently developed by a multidisciplinary group at the Scottish universities of Edimburgh and Glasgow (respectively by the department of Urban Design and Regional Planning and the Department of Social and Economic Research).

In brief, the theory in its latest version [11] was based on a quantitative method for measuring the costs related to the individual inhabitant to direct the development of a city in one direction rather than another. The method made it clear the various costs associated with the choices of territorial direction, and made it possible to identify the thresholds, or steps, that each choice of plan could generate. For example, crossing a river with urban development requires a bridge or a tunnel whose construction and maintenance costs are important and which for economic efficiency (from the viewpoint of municipal budgets) cannot be charged to a small number of inhabitants. Or on the

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contrary they can be, as long as the choice is made with good reason and full implications of its consequences on the city budget for years to come.

The reconstruction in the case of the municipalities within the HCC was exemplary. The earthquake-stricken urban cores were rebuilt as they were and where they were, starting with the historic centers, on the basis of an overall plan with the direction in the hands of local authorities. It was not labelled as "strategic plan" but it made strategic choices, on the contrary to some present day strategic plans which are not strategic at all. The planning based on threshold analysis made it possible to look beyond the emergency to the reconstruction of centers with their social and economic relations. Local construction companies played a key role. Many emigrants have returned to work. New businesses have sprung up. The management and public service functions were kept where they were, within the building centers, limiting the new building on country land to a very few exceptions.

In the area of HCC and in the whole Friuli, the reconstruction was focused from day one towards restarting the economic engine of the region which was made of a high number of business enterprises producing large household appliances, furniture (chairs, chickens etc.) and specialized food products (ham, vine, alcoholic beverages etc.). This choice was taken as part of comprehensive scheme which put aside the temptation to use the available resources to build temporary homes on agricultural land. On the opposite, this option was considered highly negative for the future of the community. Perhaps the main reason was not a ban on green-field projects for itself, or an abstract will to protect the environment, but a rationale choice to concentrate all reconstruction efforts to revive the economic engine of the region to prevent a further shift of outmigration flows, which was a real and imminent danger for the community at the time.

2.2 The case of Aquila 2009

In the case of the earthquake which struck the city of Aquila in 2009, an urban and territorial scale problem was addressed as if it were a choice of building technology. The Civil Protection Department (CPD) has been entrusted with a role that is not within its competence, that of territorial planning, and which has shown that it does not know how to play. Thus the CPD has expanded the emergency phase to the point of making choices that introduce new problems for proper spatial planning, as well as having absorbed an excessive amount of economic resources, including time which is perhaps the most limited factor in a reconstruction process. The television tried, with inaugurations, to accredit the idea that the reconstruction had been completed well and on schedule. This was not the case in reality.

In July 2009 the Italian National Planning Institute (*Istituto Nazionale di Urbanistica-INU*) released a "manifesto of the planners for the reconstruction of the city of Aquila" which affirmed that the reconstruction must be done with a guiding vision of the post-earthquake of the city through a "plan of urban structures" aimed at recovering the role of the historic center and the quality of life. That document maintained that the decision-making method must be participatory, with an active role of citizens, authorities and local businesses. In essence, it was the description of what had happened in Friuli following the 1976 earthquake, as previously described.

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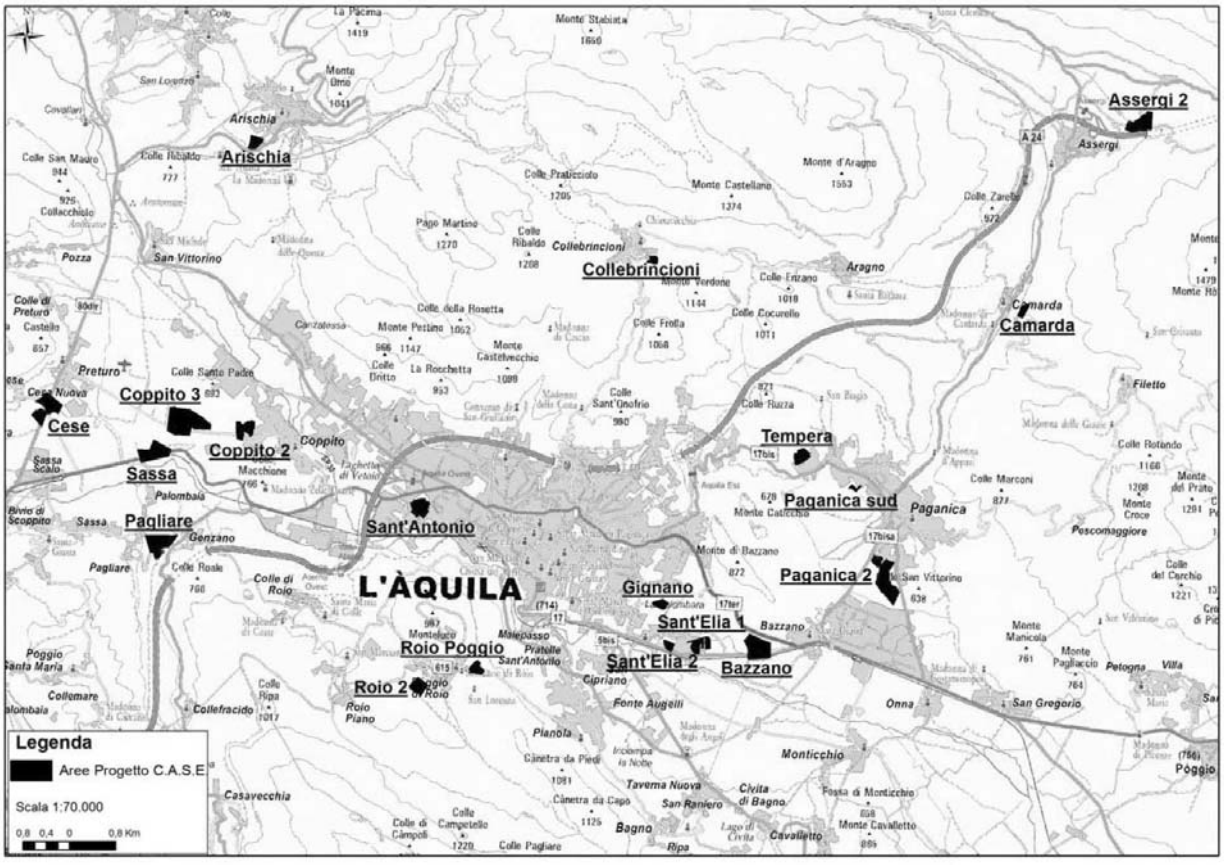
At the decision-making table for the reconstruction, space was left only to the CPD and the central government. Local administrations, including the Province and the Municipality of the city of Aquila, were not left with any decision-making power or even consultative power in the reconstruction process. In this context, the Civil Protection Department conceived and implemented a project named Sustainable and environmentally friendly anti-seismic complexes" (*Complessi Antisismici Sostenibili ed Ecocompatibili - C.A.S.E.*)

The idea was to raise multi-storey residential buildings resting on large concrete slabs cushioned by a system capable of neutralizing the seismic waves of future earthquakes. As it is known, the Civil Protection identified 19 sites (of the initial 20 planned) in tiny hamlets outside the city, at distances of several kilometers from the urban center in a mountainous area, all curves and ups and downs (this is the case, for example of Arischia at 14 kilometers, Assergi at 11 kilometers, etc.), as the map below shows.

Figure 3. City of Aquila, locations of 19 new housing settlements of the project C.A.S.E.



Source: [12]

While the identified locations had up to 7-800 residents at most, the project CASE dumped 1-3 thousands people in each place, housed in buildings built on green-field-areas. The new settlements were pompously presented as "new towns" by government spokesmen, while in reality they were just dormitories in the middle of nowhere.

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The project CASE is the pinnacle of a poor management of the reconstruction phase centralized by the government, with total disruption of basic city and regional planning principles, and disregard for the historical characters of the city of Aquila and its landscape. Urban sprawl did exist before the earthquake, but the project CASE as managed by the Civil Protection Department gave a boost to spread out housing and services activities from the historical city center.

Nevertheless, the worst planning mistake that was made in the Aquila case was a different one. In fact, the government gave to the Civil Protection Department a task that was outside the culture and technical expertise of that otherwise useful institution. The result was like placing all chips on the wrong number: the new dormitories scattered around the city, while the historical city center, the true economic and social engine of the wrecked city, was just forgotten.

In December 2009 the Higher Council of Cultural Heritage (*Consiglio superiore dei Beni Culturali*, a central state office) affirmed that 8 months past the earthquake the reconstruction has not even begun, nothing had been done for the historic center, still left to itself. President Andrea Carandini clearly stated that the construction of the "housing project" on green-field land in scattered locations risks bringing the city of Aquila to collapse and transforming it into an empty center, a new Pompeii.

In February 2010 the well-known environment institution Italia Nostra denounced with the urban planner Pier Luigi Cervellati that the city of Aquila risks becoming a "modern necropolis". The reconstruction was set up as an exclusively building problem and not a territorial one: the choice of durable buildings of the “housing CASE project” is wrong, because it drained most economic resources with the only outcome to unbalance the territorial structure of the place. Without its center, the city of Aquila has become a land of frenetic car journeys, and social relations are broken. The CASE project has poured into small hamlets a number of inhabitants even 4 times greater than the local inhabitants, with obvious technical, social and traffic problems. In the beginning of 2010, for the first time the public opinion grasped the gravity of the situation: the absence one year after the earthquake of a reconstruction plan for the historic city and a land reorganization plan.

As a sign of this public awareness, in March 2010 the television gave space to the "wheelbarrow people", indignant residents who begun to remove with their bare hands on a voluntary basis the rubble left on the ground since April 6, 2009. Perhaps the real reconstruction begun with that civil protest which was accompanied by a participatory movement of citizens and local businesses, jointly with local authorities eager to come back in the reconstruction process and play the role that they deserve.

Following the example of Friuli, the reconstruction of Aquila in Abruzzo should have begun with an effort to restart the economic engine of the hit city. The case of Friuli took place in the late Seventies, so it is not a surprise that the economic engine there was a mix of the secondary sector and specialized primary sector business activities. But in the case of Aquila, 33 years later, the economic engine of the city was neither the agricultural nor the industrial sectors, but the mixed-service sector housed in the historical city center of Aquila. Thus, restarting the economic engine of Aquila meant rebuilding as top priority the historical city center. But the reconstruction took a different path, despite several warnings not to do so [13-14-15,169].

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The economic and social engine of the city of Aquila and surrounding region is by no doubts the historical city center, fulcrum of mixed used activities and beating heart of a services-based city exactly as the industrial sector and specialized primary sector were the engine of Friuli in 1976. It is time to recognize how severe was the mistake to invest most of the available economic resources in new housing settlements built by the CASE project on green-field locations scattered with no reason around the city. In 2014 Massimo Cialente, the mayor of Aquila, declared with reference to the master plan of the city that he hoped to approve within 2016, that some of the newly constructed housing neighborhoods had to be teared down [16].

To date, the new master plan has not yet been completed, it has just reached the first draft stage following the decision n. 38/2017 made by the City Council (CC) of Aquila. Embarking now in a battle to refurbish and/or demolish the badly built new housing plots would be a new mistake. Based on the successful experience of Friuli 1976, all financial and intellectual efforts should be concentrated in turning on the engine of Aquila, the one that was forgotten after the earthquake of 2009.

The engine to be turned on in full as soon as possible is the historic center of the city of Aquila. The complete reconstruction of the historic center of the city of Aquila means that its economic base will be reborn. With the city service economy up and running, the social networks of the city will be also revived and the institutional mission to reconnect and restore a live community after the earthquake will be accomplished. If this will be done, the city of Aquila can go back to being what it always was, a compact, lively, dense city, and not a series of dormitory settlements in a suburb without a center.

3. The first item of the to-do-list: single out the engine of the community

Italy is one of the countries in the Mediterranean region with the highest seismic risk, due to its geographic position at the conjunction of the African and Eurasian plates. As shown by the above Figure 1 of the Italian Institute of Geophysics and Volcanology (INGV), the highest seismicity is concentrated in the central-southern part of the peninsula, along the Apennine ridge, plus in the northern part of the country in the regions of Friuli and , western Liguria, and in the southern regions of Calabria and Sicily. Wherever the next big earthquake will hit, it makes sense to have a readily available list of dos and don’ts for the first hours and days after the disaster, to save as many lives as possible. As the first section of this paper has detailed, the Italian Civil Protection Department has already fulfilled this task, the list is available in Italy and it is comparable with the “Seven Steps to Earthquake Safety” produced by the Earthquake Country Alliance (ECA) in California. But it would also make sense to prepare as a joint venture of public institutions with the support of independent experts, an agreed list of dos and don’ts for the first 12 months after the disaster, to restart the economic and social engine of the destroyed centers.

It is relevant to pose the question, how to reconnect and restore (with ECA words) a community after an earthquake? The case of Friuli 1976 teaches that a complete reconstruction is possibly without expanding the urban centers hit by the seismic shakes, under the condition to concentrate the efforts on the economic engine of the local community with a strategic plan. The case of the city of Aquila has

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made more than clear what are the dangers for community life if the economic and social engine of a place is forgotten in the reconstruction phase.

There is enough evidence in the recent history of natural disasters in Italy, to draft a list of best practices and a list of what has proved to be a dead-end road. The text is restrained to the earthquakes of the north-east region Friuli in 1976 and of the city of Aquila in the southern region Abruzzo in 2009. These two events epitomize two different methods of approaching the reconstruction phase after a major natural disaster. The two cases differ in terms of local governance, urban planning and overall outcome. In Friuli there have been about three times casualties than in the earthquake of Aquila. In the first case the earthquake hit the region twice in the same year (1976) and in a larger area, compared to a single strike and a smaller area of the second case. Nevertheless, the reconstruction of Friuli is generally regarded as a success, while Aquila is not. Indeed, the case of Aquila was such a major failure, that it has become a living lab of what not to do in case an earthquake will hit again an historic city of comparable size somewhere else in Italy.

A complete set of dos and don'ts is useless without a good knowledge of the urban and regional context in which planners act. To compare the two cases, one should notice that public authorities identified different engines for the reconstruction phase. In the Friuli case, the engine was identified with the economic base of the area, thus policies were directed at making business firms up and running as soon as possible. The historical city center of Aquila was the economic and social engine of the destroyed area, thus public policies should have acted accordingly, but they did not. Most of public spending was placed on the development of housing clusters scattered in various municipalities, far from the city core. The outcome was the displacement of residents and business activities, with permanent negative effects. The core-built area of any city should be regarded as the engine for a strategic reconstruction plan, to be implemented within strict deadlines after the next earthquake.

A real reconstruction means restore daily life by reconnecting with others, repairing damage, and rebuilding community threads. This can be done by anchoring the residents to their usual workplace and by providing new ones. The focus should be on the community throughout the reconstruction phase, and by "community" we should mean the residents (people, enterprises, institutions), with all their personal plans, resources and hopes, not just the collapsed walls to be repaired or, worst, be rebuilt somewhere else.

Timing is the key factor for any successful reconstruction program. A debate on reconstruction principles alongside an emergency event is not the ideal setting to make rational decisions, thus national guidelines for reconstruction plans should always be available. Saving lives is of course top priority following an earthquake. But right after this phase, local and central governments are expected to implement a reconstruction plan swiftly. The reconstruction should be a policy prepared in advance at local level through a strategic approach whose guidelines should be set at national level. Having regard to the experiences of two iconic cases of earthquakes occurred in Italy (Friuli 1976 and Aquila 2009), it seems possible to jot down a brief list of dos and don'ts as a guidance for the first 12 months of the reconstruction phase of future earthquakes.

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Table 1 A list of dos and don'ts for the next earthquake reconstruction in Italy

Successful factors to watch	Friuli 1976	Aquila 2009	The next place
1. Local governance Reconstruction plan with single desk with direct involvement of municipalities, citizens, grass-root stakeholders and business enterprises	Yes	No	Yes
2. Community engine Swift identification of the social and economic engine of the destroyed urban area	Yes	No	Yes
3. Fast response Efficient management of the time factor in restoring the social and economic engine of the destroyed urban area	Yes	No	Yes
4. Strategic plan Strategic urban planning focused on long-term renaissance goals and on short-term milestones relevant for the local urban community and their business environment	Yes [1]	No	Yes
5 No urban sprawl Brown-field projects as a rule, green-field project as rare exceptions. No "new towns" whatsoever. Recover from past urban sprawl, ovoid new urban sprawl	Yes	No	Yes

According to the list in Table 1 above, the way to go about the reconstruction phase in future earthquakes in Italy seems to have some strong reference points. Any successful reconstruction activity should be inspired by the goal to revive the local community as soon as possible after the disaster. The preferred form of governance should include a representative mix of municipalities, citizens, grass-root stakeholders and business enterprises. The reconstruction program should not be based solely on urban planning rules, whose limits have already been highlighted [17, 379]. A strategic planning process should be designed and implemented, based on a single decision-making table with public and private stakeholders joint in the effort to single out, in the case at hand, the economic and social engine of the community. The available resources should be targeted to turn on swiftly the engine so identified. A critical factor to watch is timing. The reconstruction strategic plan should be focused on long-term renaissance goals and on short-term milestones relevant to the local urban community and their business environment. As the strategic planning method requires, monitoring and reporting should be carried out on an open-source platform.

New green-field real estate developments may be admitted as rare exceptions, while brown-field projects should be the rule for local building codes. No "new towns" whatsoever should be allowed. Finally, the reconstruction plan may become a great opportunity to fix cases of past urban sprawl, which are present almost everywhere now, not just to prevent new urban sprawl waves.

Notes

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