

A network of research groups and companies for research, innovation and training

D.3.2.2

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1. Introduction: towards a network of research groups and companies in innovation and training for risk management

According to ToR from the Firespill Application Form, the network is expected “to reinforce the process of fine tuning evidence-based harmonization of CBC solutions” on disaster risk assessment and management. Therefore, apart of supporting the elaboration of D.3.4.3 on common approaches in governance model methodologies for reconstruction after a natural disaster, the enquiry questionnaire elaborated for the purpose of this specific report appears also as a good basis also to design the general settings of D.2.2.2.

It is useful to remember here that out of the 21 questions of the questionnaire dealt with, the first set (from 1 to 15) targeted a **survey on Risk Management (Mitigation, Preparedness, Response, and Recovery actions)** while the second set (from 16 to 21) specifically addresses the role of **the Civil Protection system**. The subsequent reporting outlined the basic characteristics of a possible common framework, in terms of approach and actions, towards a shared methodological model of governance for post-disaster reconstruction, including the social and economic relaunch of the territory hit.

Apart of the proponents – PP10 Emilia – Romagna Agency for Reconstruction, together with the University of Ferrara and PP2 Abruzzo Region - the questionnaire received a total of 9 responses received, provided by

1. PP13 - Split - Dalmatia County
2. PP4 – ATRAC (Adriatic Training and Research Center for Accidental Marine Pollution Preparedness and Response)
3. PP9 - Civil Protection Department of Puglia Region
4. PP11 - ARPA Friuli Venezia Giulia (Environmental Protection Agency)
5. PP5 - Zadar County
6. PP3 - Dubrovnik-Neretva Region
7. PP8 - Development Agency of Šibenik - Knin County
8. PP6 - Civil Protection Service of Marche region.

In terms of participants into the network, the institutions and experts that took part into the enquiry seem to set a very good “core group”.

On the other hand, Emilia-Romagna Region holds a very relevant experience in setting networks of research groups and companies, within the so-called “regional network on high technology” of which the Clust-ER “Build”, operating on the building sector, is a pillar, addressing in particular the needs of the building and construction sector of Emilia-Romagna (see <https://build.clust-er.it/en/>). An experience that, in our thinking, could be of relevant usefulness for the entire partnership.

This document aims at outlining the main characteristics, field of interest and possible members for establishing a risk management-targeted network, starting from the basis of the experience implemented by the Emilia – Romagna Region.

2. A good practice: the Emilia-Romagna Clust-ER “Build” network

The “Build” Clust-ER is an association of public and private organisations (companies, research centres and training institutions)¹ that aims to support the innovation system in the building and construction field, developing collaborative research and technology transfer activities, according to the priorities of the Emilia Romagna Region Smart Specialization Strategy (S3). Build also has as its overall objective the consolidation and further implementation of the already established network, increasing the long-term value growth of the entire construction chain and knowledge, basing its existence on the principles of open innovation and making best value of the learnings arised from the 10 years experience in reconstructing the territory hit by the 2012 earthquake.

In times in which the construction sector is characterized by the creation of demand and the reduction of the margins of economic sustainability of processes, the characterising element of the association is cooperation or, rather, the relationships that are established between the network members, without necessarily

inhibiting competition between them, intending to exploit of mutual complementarities, valorizing the competitive advantage of the relationships (technological, productive and commercial) between companies. As the construction sector continues to be a strategic sector in regional, national and European economies, in particular due to the high number of employees in the supply chain itself, as well as to the growing number of new players (including micro or small businesses), is showing a strong potential for developing innovations along the entire supply chain, allowing solutions also in managing risk reduction (seismic, fire, floods, etc.) This makes the Clust-ER Build experience particularly relevant from the point of view of promoting prevention and management for several types of risks. Created in 2017 as a result of the Regional High Technology Network Platforms (<https://www.retealtatecnologia.it/en>), today the CLust-ER BUILD has 107 members such as public bodies (universities, network laboratories), enterprises and start-ups, and training institutions.

General characteristics and objectives

Build focuses on three strategic lines of research and innovation:

- Conservation and enhancement of historical and artistic heritage for recovery, restoration and intelligent reuse, thanks to technological and innovative processes.
- Energy efficiency and sustainability in buildings, for efficient, resilient and sustainable buildings.
- Security of buildings and civil infrastructure, to reduce their vulnerability and mitigate environmental risk (seismic, hydraulic and hydrogeological).

These are intended as instruments to support virtuous pathways of triggering regenerative dynamics that intervene on physical, economic and social aspects of the process. Main objectives are:

- to encourage product and process innovation, in order to promote greater economic and environmental sustainability for the entire production cycle and use of the asset;
- to foster process innovation, increasing industrialisation of processes, skill specialisation, adoption of instruments for the interoperability of information flows;
- to stimulate plant engineering and structural measures, integration of specialised components, functions and skills, certified energy management and use of on-site generated renewable energy;
- to boost a conscious use of resources depending on the various target groups involved;
- to reduce vulnerability (seismic, hydrogeological and hydraulic risk) of the existing buildings and environmental patrimony, also via the containment of the anthropogenic factors;
- to support the development and adoption of less invasive technologies in the field of security, vulnerability and in general intervention on existing constructed assets;
- to foster the adoption of built-in monitoring systems in order to support data-based decision-making processes throughout the life cycle of the building product.

How the network works: the Value Chains

In its five four years of activity, the Build has consolidated four permanent working tables (Value Chains - VC) SICUCI, INNOVA CHM, RIGENERA and GREEN2BUILD, each one managed by a university/applied research chair and by two co-chairs from the business world. The working tables define the objectives to be pursued, as well as to evaluate the results.

Furthermore, a permanent Task Group on the subject of "High-level Education" occurs within Clus-ER BUILD with the purpose of transferring the results of debates on strategic innovation and development pathways as well as the outcomes of collaborative industrial research for the ongoing updating of skills in the construction industry.

In relation to the overall topics mentioned, Clust-ER BUILD is a technology transfer partner in nationally and internationally funded collaborative research projects.

SICUCI – Building and infrastructure safety

“SICUCI - Safety of Buildings and Infrastructures” aims at improving the safety of buildings and civil infrastructures and the reduction of risk from environmental and exceptional events by developing innovative materials and technologies. In order to assess and increase the safety level of constructions and civil infrastructures and to reduce the risk of the environment (seismic, hydraulic and hydrogeological) and from exceptional anthropogenic events (fires, impacts, explosions), the VC pursues the following objectives:

1. Reducing the vulnerability of the built heritage:

- a. Evaluation of the seismic vulnerability of buildings by means of diagrams, models and direct tests to be carried out in situ on the structure and in the soil affected by the foundation.
- b. New technologies for seismic reinforcement/adaptation of structures and foundations, with innovative materials and advanced technologies (seismic energy dissipation/mitigation, structures reinforcement, etc.);
- c. New multifunctional construction systems, using innovative and sustainable materials, for the realisation of safer and more durable new buildings with a low level of environmental impact.
- d. New construction systems or components, based on high levels of engineering or industrialisation, for the realisation of new low-damage seismic-resistant constructions;
- e. Monitoring systems for constructions, to be integrated into the building systems (domotics) and of the foundations and soil concerned, to verify behaviour during operation and exceptional events.

2. Vulnerability reduction and management of civil works (hydraulic, energy, transport, land protection)

- a. Road infrastructure: vulnerability assessment for seismic and/or exceptional events (terrorist attacks, natural disasters) of transport infrastructures (roads, railways and airports; new multi-purpose construction systems, using innovative and life cycle sustainable materials).
- b. Hydraulic infrastructures: i. sewerage networks, monitoring inflows in real time, first rain basin systems for abating organic and chemical substances, inflow reduction into the network, etc.; ii. aqueduct networks management and hydraulic remediation; iv. Analysis of the level of services (fire supply, special users).
- c. Land protection: i. evaluation of hydraulic/seismic vulnerability of earthworks, natural/artificial slopes affecting civil works; ii. low-cost technologies to increase soil strength and mitigate the seismic/floods effects; iii. spatial monitoring systems to assess stability under ordinary and exceptional operating conditions.²

INNOVA CHM

The Value Chain “Conservation and enhancement of the built, historical and artistic heritage” includes the architectural and urban heritage of the 20th century, in the context of historical, listed, monumental and expressions of material and non-material culture. Its development objectives concern:

1. materials and technologies compatible with traditional building techniques, aimed at improving the performance (comfort, safety, energy behaviour) of the built environment;
2. new diagnostic technologies and optimisation of available technologies for historical, cognitive in situ investigation and expeditious data acquisition;
3. tools and technologies for seismic risk assessment of building and urban aggregates;
4. monitoring systems for the real-time acquisition of data on the maintenance over time of building performance requirements and user behaviour in different contexts
5. accessible databases for documenting the building lifecycle (BIM for managing knowledge of materials and technologies, design, management and end-of-life phases);
6. methods for seismic risk assessment at the building aggregate and urban scale and the definition of strategies for seismic improvement of the built heritage and reduction of vulnerability
7. methods for the assessment of the energy behaviour of the existing built heritage and for the definition of energy improvement interventions of buildings and urban structures
8. optimisation, standardisation and interoperability of processes in terms of integrated design;
9. tools and methods for assessing the effectiveness of performance improvement interventions in existing buildings;
10. methods and tools for verifying design quality, controlling and reducing costs, meeting deadlines and lean construction management of the project life cycle³.

RIGENERA

RIGENERA aims to improve regenerative, multi-dimensional (space and time), multi-discipline and multi-actor processes by developing skills and experiences at the regional level. The VC studies, tests and develops tools to support city transformation processes in particular:

1. regenerating the urbanised territory, improving urban and building quality, esp. referred to energy and resource efficiency, environmental performance, compliance with earthquake and safety regulations, health and comfort of buildings, quality and liveability of urban spaces and neighbourhoods;
2. designing promotion strategies and technical, financial and communication support for existing and future regeneration practices;
3. Interpreting “resilience” (urban, environmental, social) as an opportunity to rethink and regenerate cities, neighbourhoods, artefacts taking into account transition and adaptation processes and the vulnerability of urban socio-ecological systems;

The aim is to develop advanced digital 'tools' to support the physical and functional regeneration of cities and their social and cultural components, from the perspective of economic sustainability⁴.

GREEN2BUILD

Green2Build aims to promote energy-efficient and resilient buildings that are environmentally, economically and socially sustainable through:

1. the redevelopment of the existing building stock with respect to environmental, energy, economic sustainability, giving buildings and cities the capacity to adapt to climate change;
2. the integration of heritage rehabilitation objectives (multiobjective rehabilitation) with reduction of seismic vulnerability in the framework of energy-environmental regeneration of buildings and cities
3. attention to the comfort and healthiness of occupied spaces (indoor and outdoor);
4. the transition towards a circular economy, favouring the decarbonisation of the building sector, through the re-use of raw materials, the use of materials (including biomaterials), sustainable and efficient components and technologies, the reduction of water consumption
5. the conscious use of energy resources, aiming at the realisation of comfortable and healthy buildings with zero energy balance (ZEB) and zero environmental impact (ZIB)
6. the optimised integration of components, functions and competences (envelope-plant, IT integration in the building-plant system, integrated design and execution, monitoring and control)
7. a life cycle approach (design, construction, operation and decommissioning) using tools such as LCA (Life Cycle Assessment) and LCC (Life Cycle Costing)⁵.

3. How Firespill partners may benefit from Emilia-Romagna ClustER Build experience

As stated in another deliverable (D.3.4.3), good territorial governance, also in the case of the needs imposed by disaster management, show a series of criteria that stand at the basis of its effectiveness and sustainability:

1. *subsidiarity* in the allocation of functions and responsibilities;
2. *equity*, both in preparedness policies and in access to reconstruction resources;
3. *accountability and transparency* in decision-making processes;
4. *civil commitment of citizens*, with much emphasis on democratic participatory processes, as creators of consensus around choices,
5. *efficiency of the administrative apparatus*, avoiding the creation of new institutions;
6. *capacity for leadership*.

More than a decade of disastrous events hitting Italy and Croatia and in particular the Firespill project area, tells us how complex it can be to have a prepared emergency management structure in place before an emergency occurs, as disasters are mostly unpredictable in terms of probability of occurrence and actual magnitude. But tells us also that continuous research and innovation, the capacity to cooperate between

public and private partners of different nature, a general attitude that turns social and economic stakeholders into proactive actors, strongly contribute to damage minimisation. And, in the case of ClustER Build, also contributes to the capacity of a work method (or of a “model”, if we prefer the term) to learn from experience, capitalizing all knowledge that the – although tragic – experience of the 2012 earthquake brought about.

The totality of the experiences done by Emilia-Romagna in managing the disaster found in Firespill the opportunity to systematize that knowledge within a new operational framework, that will probably be very useful in these days in which a new, disastrous, flood hit the regional territory. Once again, securing the territory, must be considered a political priority, not a cost but an investment made in the present with an eye to the future of a country and its community. This is the real field of the new challenge of how to concretely decline the mission of increasing what presently we use to call “territorial resilience”.

Again, it is not only a matter of “*adaptation*” after a shock but of the capacity to make the best value also of a disaster, creating new learnings that allow innovation: this is the real spirit of “*adaptability*”, a capacity that, by leveraging *social capital* and the cooperation networks that characterises it, increases the global “resilience” of a territorial system, selecting those innovations that update and upgrades the “*identity*” of places and communities.

ClustER Build – and more in general the regional network of the clusters of the regional High Technology Network – is an example of this “adaptability” skill, that we propose Emilia-Romagna proposed to its Firespill partners as a model that can be followed, to which initiatives to pay attention, with which to establish relations, starting from those that proactively cooperated to the design of a common model and work method⁶.

Obviously, every Firespill partner is warmly invited to stay tuned with the evolution of this experience, assess how this could be transferred in their respective territorial context, search for the establishment of relations of collaboration in view each actor to reinforce their capacity to deal with the challenge of risk prevention and management⁷.

Annex: list of the core Firespill partners taking part into the network

Firespill partners taking part into the network of research groups and companies created for innovation and academic research and training

| N° | Institution | Country | Name | email |
|----|---|---------|----------------------|--|
| 1 | Emilia-Romagna Region – Agency for Reconstruction – Earthquake 2012 | IT | Antonino Libro | antonino.libro@regione.emilia-romagna.it |
| 2 | University of Ferrara – Dept. of Architecture | IT | Fabiana Raco | fabiana.raco@unife.it |
| 3 | ClustER Build – Regional cluster of the building sector | IT | Silvia Rossi | silvia.rossi@build.clust-er.it |
| 4 | Dalmacija County | HR | Mate Franetovic | mate.franetovic@dalmacija.hr |
| 5 | ATRAC – Adriatic Training and Research Center | HR | Luka Erlic | luka.erlic@atrac.hr |
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| 15 | Split County | HR | Andelka Vukovic | angelikaobrt@gmail.com |
| 16 | RERA SD Development Agency | HR | Helena Brcic | helena.brcic@rera.hr |