

Design of Communities of Innovation

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SUMMARY

This document sets the theoretical basis and initial planning for BRIGAIID Communities of Innovations (Col's). This is done by defining the expected characteristics and aims of these communities and identifying clear examples of the activities planned and expected outcomes from end-user involvement.

The next deliverables D7.9 and D7.12, to be issued at M33 and M48 shall detail the activities undertaken and the outcomes produced.

1. Theoretical basis

1.1. The concept of Community of Innovation

1.1.1. Defining the concept of Community of Innovation

BRIGAIID adopts the definition of Communities of Innovation as a “*form of **Communities of Practice** (CoP) that are dedicated to the support of **innovation***” (Coakes and Smith, 2007).

These authors provide some commonalities between a CoP and a Col:

- can be formed from champions of innovation and their social network,
- should be safe places for the creation and support of innovatory ideas,
- are often formed by groups made up of motivated individuals working together towards a common goal, not because of orders from their superiors, but because they are convinced of their common cause.

However, this definition remains incomplete without specification of how we understand the terms of ‘innovation’ and ‘communities of practice’.

- **Innovation** is a widely used term, yet its interpretation or meaning can be quite broad and varied. This is acknowledged by the Horizon2020 programme that states that “*Horizon 2020 will support all forms of innovation, including innovation that results from research and development (R&D) activities or from other activities, such as finding new uses or combinations of existing technologies or developing new business models or new ways of interacting with users. While innovation is generally understood as the commercial introduction of a new or significantly improved product or service, innovations can also be for non-commercial applications such as for better public services or for addressing social needs ('social innovation')*”.

From a technological perspective, innovation can be defined as the “*production or adoption, assimilation, and exploitation of a value-added novelty in economic and social spheres; renewal and enlargement of products, services, and markets; development of new methods of production; and establishment of new management systems. It is both a process and an outcome*” (Edison et al, 2013). From a social innovation perspective, we

can find definitions such as “the generation and implementation of new ideas about how people should organize interpersonal activities or social interaction, to achieve one or more common good goal” (Mumford, 2002).

- **Communities of practice** are defined as “groups of people or organizations who share a concern or a passion for something they do and learn how to do it better as they interact regularly” (Wenger-Trayner, 2015). Through the sharing of practice participants learn together, focusing on problems directly related to their work (Wenger and Snyder, 2000).

A Community of Practice does not necessarily intend to innovate in their activity or outcomes.



1.1.2. Other related concepts

Nowadays, there are concepts of groups of people or organisations that may conduct common activities related to innovation, i.e. innovations clusters and living labs. This section provides a definition for these two concepts and identifies how these relate to the concept of Col:

- An **innovation cluster** is a complex dynamic system of co-located regional actors, which has different modes of creation, financing, and operation, depending upon the country and the given region. Innovation has proved to perform better in clusters (Muro and Katz, 2010), and they have become a popular instrument of modern innovation policy activities. Clusters are economic networks of firms, knowledge producing agents, bridging institutions and customers, linked to each other in a value-adding production chain. The focus is on the linkages and interdependence between actors in the network of production when producing products and services and creating innovations.

In general terms, the innovation clusters can be considered as a type of Col operating at a regional or even national scale and covering a broader range of topics¹ than a BRIGAIID Col will do.

¹ Such is the case of, for example, the Romanian [Green Energy Biomass Innovation Cluster](#), where “biomass distributors, boiler and equipment manufacturers, distributors and biomass end users are linked with research organizations, universities and public administration in order to enhance cooperation, stimulate innovation, spread knowledge in the field of the solid biomass with the final aim of developing the market for the sustainable use of the biomass for energy purposes”.

- A **Living Lab** is a network that integrates both user-centred research and open innovation². Following the open innovation approach means that the company can use external resources and in turn make available their own innovations to other organizations.

The use of living labs has emerged as a novel form of creating competences and competitive advantage³. An increasing number of managers are interested in living labs as a way to transform their conventional R&D organizations to follow an open-innovation model (Westerlund and Leminen, 2011). Open innovation builds on intense co-development with users and the end result is expected to better solve customers' needs and wants. Therefore, users are innovators, co-designers, co-producers, and entrepreneurs in regard to new products and services (Pascu and van Lieshout, 2009).

We consider Living Labs as a type of Col operating at a local scale and involving a broader end-user involvement than usually a BRIGAID Col will do.

1.1.3. How BRIGAID aims to develop Communities of Innovation

We summarize the potential generic role of Col's as structures that facilitate: i) the sharing of knowledge; ii) bringing or generating opportunities; iii) incubation and prototype creation; and iv) dissemination and upscaling of ideas.

According to West (2009), factors that contribute to the development of a Col include:

- a) diversity, member's interdependence and full participation,
- b) generation and selection of ideas,
- c) an appropriate environment for innovation and
- d) common objectives and motivation.

BRIGAID envisions the Communities of Innovation (Col's) as social networks composed by several geographically connected actors in one field or in different disciplines but with a common goal or aim. The network can provide valuable input, feedback and support for the creation of

² Open innovation is "the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively." There are two facets to open innovation. One is the "outside in" aspect, where external ideas and technologies are brought into the firm's own innovation process. This is the most commonly recognized feature of open innovation. The other, less commonly recognized aspect is the "inside out" part, where un- and under-utilized ideas and technologies in the firm are allowed to go outside to be incorporated into others' innovation processes. (Chesbrough, 2011)

³ A good example is the Massachusetts Institute of Technology (MIT) with its Media Lab first explored the concept of living lab, and now promotes research and innovation through different living labs, like the City Science project in Andorra³, where the MIT Media Lab's City Science research group, the University of Andorra, and national and international companies are collaborating in order to bring an innovative ecosystem into the capital of Andorra, engaging local stakeholders on how to improve urban development and planning.

innovations. These networks of organizations and individuals combine business, policy and management sectors, focused on bringing new products, new processes and new forms of organization. They will involve innovators, managers, practitioners, researchers, citizens and decision-makers in search of solutions for vulnerability reduction on specific conditions and hazards, bringing innovation into climatic events structures around adaptation solutions.

1.2. Communities of Innovation as part of an innovation ecosystem

The challenge of innovation management has evolved from technology-based product and process management to network-based value creation and ecosystem thinking, i.e. the innovation ecosystem. The functionality of an innovation ecosystem can be compared with that one of a natural ecosystem (Jackson, 2011). Natural ecosystems are complex set of relationships among the living resources and habitats that maintain a balanced state. In a similar way, an innovation ecosystem models the complex relationships that are formed between actors or entities whose goal is to enable technology development and innovation.

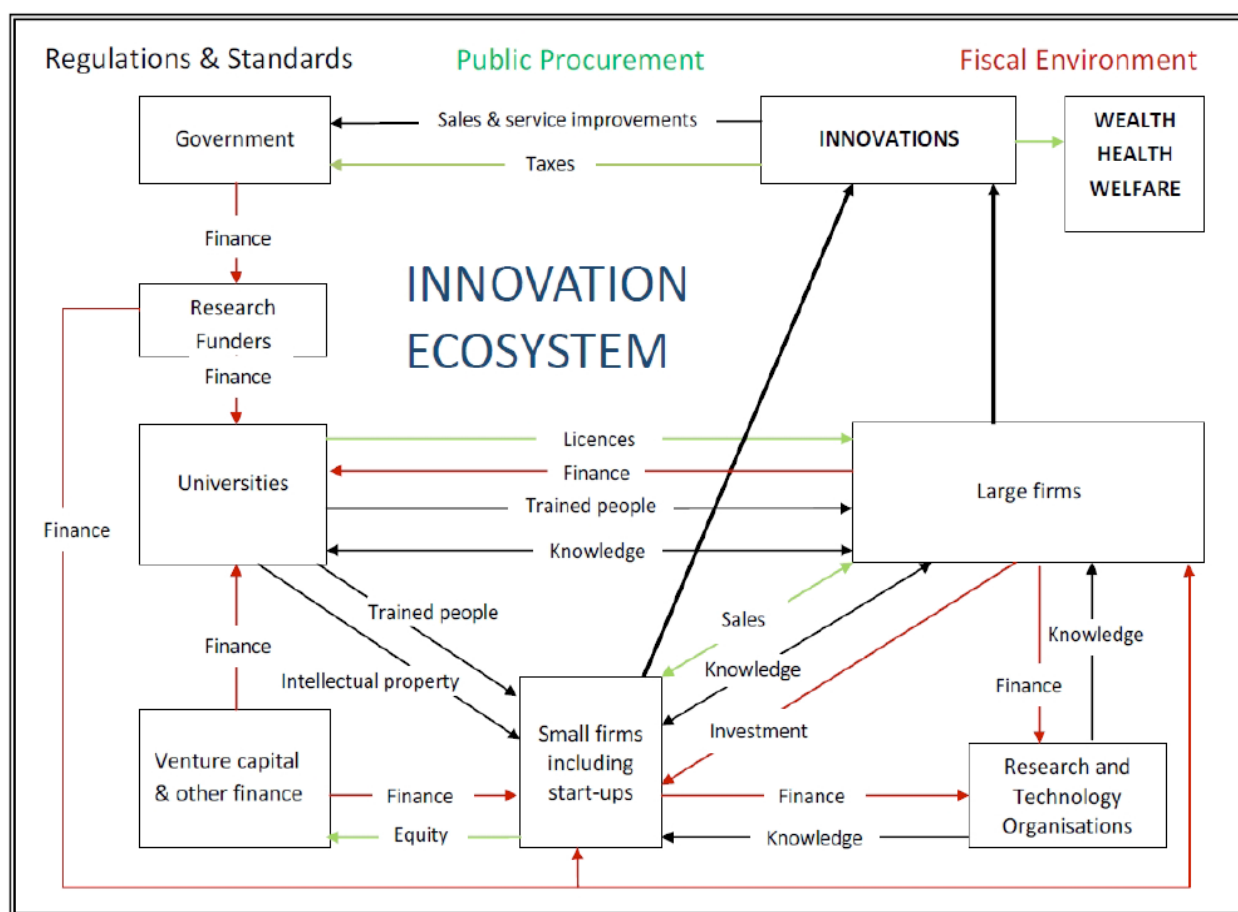


Figure 1. Innovation ecosystem framework. (Source: Georghiu, 2015)

In this context, the actors would include the material resources (funds, equipment, facilities, etc.) and the human capital (students, faculty, staff, industry researchers, industry representatives, etc.) that make up the institutional entities participating in the ecosystem (e.g. the universities, business firms, industry, university research institutes, federal or industrial supported Centers of Excellence, and state and/or local economic development and business assistance organizations, funding agencies, policy makers, etc.).

Maybe what makes ecosystems of innovation different to the other concepts, is the dynamism and complexity of the relationship of its components. The context for the whole ecosystem (see figure 1) is determined by the regulations, standards and the fiscal environment set by Government. As the Science and Technology Committee (2013) states:

“Universities and Public Sector Research Establishments attract finance and produce trained people, knowledge and intellectual property. Research and Technology Organisations perform a similar but more commercially oriented function. Finance flows from Government, larger firms, seed and venture capital organisations, banks and public markets. Ultimately the innovations that generate jobs and wealth are developed by businesses large and small and depend on a complex web of finance and knowledge transfer between these public and private organisations. The purpose of innovation policy is to ensure that both knowledge and finance flow efficiently to support the commercialisation of innovative products and services.”

BRIGAIID acknowledges that the Communities of Innovation are a part of the broader innovation ecosystem and that connections with other elements of this ecosystem are required for upscaling of activities and dissemination of results. Thus, the linkage with the WP6, which deals with market analysis, business models and funding mechanisms, is key to effectively contribute to BRIGAIID aims.

1.3. Examples of other communities of innovation

Many innovation initiatives have been promoted during the last years, in different organizational and institutional forms (see Table 1 and annex 3). Some of these initiatives have been selected as a means to gain insight and look for lessons learned that in the future may be taken into consideration by BRIGAIID.

Table 1. **Types of Communities of Innovation, according to who hosts, funds and Col focus (Source: Lippitz et al, 2012)**

GENERIC TYPE OF INITIATIVES	ACTUAL EXAMPLES
University-led groups where executives share case studies and lessons in innovation and entrepreneurship management and implementation <i>Host:</i> University <i>Funding:</i> Government, business or non-profit <i>Focus:</i> Business	<ul style="list-style-type: none"> Cardiff University Innovation Network Berkeley Innovation Forum
Government-sponsored agencies that foster collaboration among businesses and connect them to academia and government <i>Host:</i> Government. <i>Funding:</i> Government or business <i>Focus:</i> Business	<ul style="list-style-type: none"> Nordic Innovation, Colorado Innovation Network
University-led groups where executives share case studies and lessons in innovation and entrepreneurship management and implementation <i>Host:</i> University <i>Funding:</i> Government, business or non-profit <i>Focus:</i> Business	<ul style="list-style-type: none"> Cardiff University Innovation Network Berkeley Innovation Forum
Business executive groups that share best practices in innovation management <i>Host:</i> Business <i>Funding:</i> Business <i>Focus:</i> Business	<ul style="list-style-type: none"> Club de Paris des Directeurs de l'Innovation
Nonprofit organizations that promote sharing of business-building skills among independent entrepreneurs <i>Host:</i> Nonprofit <i>Funding:</i> Government, business or non-profit <i>Focus:</i> Business	<ul style="list-style-type: none"> The Massachusetts Institute of Technology (MIT) Venture Mentoring Service The Honey Bee Network
Groups of government or nonprofit organizations that share innovation <i>Host:</i> Government or non-profit <i>Funding:</i> Government or non-profit <i>Focus:</i> Government or non-profit	<ul style="list-style-type: none"> The Urban Sustainability Director's Network (USDN) Mistra Urban Futures

Two examples considered as particularly interesting for BRIGAIID Col's, in terms of methodologies applied to dynamize innovations and the thematics covered, are (see more information in annex 3):

- the Climate-KIC initiative, managed by the European Institute of Innovation and Technology (EIT), acts as an accelerator of innovations through an integral approach that includes education, research and innovation independently but simultaneously. This provides an example of a Col supporting supply-driven innovation.

- We@eu: Water Efficiency in European Urban Areas, which is a project funded under FP7 and finalised in 2016. It was a research-driven project focused on the activity of four water related innovation clusters. This enabled the participating clusters and regions to bring together knowledge and innovation potential through trans-national collaboration and mutual learning. This provides an example of a Col aiming to hinder the drivers of demand-driven innovation.

1.4. The expected added value of Col's for BRIGAIID

The concept of Communities of Innovation is often referred in the Description of Actions (DoA) that specifies the main actions to be implemented by BRIGAIID. However, the DoA does not include specific targets for the number of Col's to be involved nor a detailed description of their characteristics and expected actions to be developed.

The main goal expressed in the DoA for the Communities of Innovation is *“facilitation of the market outreach and uptake of innovative and operational products and solutions”*.

In order to achieve this goal, BRIGAIID acknowledges that climate change adaptation is a place- and context-specific process. This motivates that each Col shall aim to involve and bring together several actors, -specifically innovators, end users, leading sectoral users, investors and societal interest groups-, in areas with common problems, e.g. risk reduction to a specific hazard or cluster of hazards, and environmental conditions.

The DoA mentions that Col's shall be structured based on the premise that *“innovation requires involvement from many actors and effective interaction amongst these, whilst recognizing the influential role of institutions in shaping how actors interact”*. Therefore, it is intended that BRIGAIID Col's emerge as a set of networks of actors combining business, innovators, policy and/or management sectors, focused on bringing new products, new processes and/or new forms of organization into climatic events structures around adaptation solutions.

Another reference is done within the DoA to the innovation ecosystem, considered as a broader sphere which encompasses the potential activities of the Col's. It is anticipated that the effectiveness of the actions performed by the Col's depends on *“drivers and barriers to innovation in relation to the institutions and policies that affect the way different agents interact, access, exchange and use knowledge and in short, bring these innovations into action”*. These aspects shall be considered as part of the elaboration of the plans of intended actions and activities in the local Col's.

Building on these generic goals, this document aims to provide a more specific definition of how it is expected that BRIGAIID Col's may facilitate the market outreach of BRIGAIID results, i.e. innovations supported by BRIGAIID, the Climate Innovation Window and the methods developed by BRIGAIID to advance technical, social and market readiness of innovations.

At this stage, it is relevant to mention that BRIGAIID acts as a facilitator and promoter of the establishment and activity of different types of Col's, also supporting the mutual learning among these Col's. However, the involvement of a large number of actors outside of BRIGAIID is a required condition for the full effectiveness of these Col's, i.e. Col's that move beyond

dissemination of information but actively forge multi-actors partnerships for innovation to achieve market outreach. Their involvement or commitment cannot be ensured by BRIGAIID and thus, the achievement of our goals for the BRIGAIID Col's cannot be fully guaranteed.

The Col's identified in this document have to be considered as options that are going to be explored. BRIGAIID is fully committed to provide support to these initiatives although there is a number of conditions that cannot be controlled beforehand – interest of key persons and actors in innovation, changes in institutional or regulatory frames, budget constraints for end-users, etc. Therefore, a relevant aspect is the regular monitoring of the development of the activity of Col's. In those cases when a Col is underperforming a decision on whether continue or increase the support shall be made, e.g. when a Col does not achieve the expected involvement or representativity of key actors, or presents a very limited activity. On the other hand, BRIGAIID will keep exploring for new potential Cols to be engaged into our activities.

It is anticipated that the initial set of Col's identified by BRIGAIID will probably differ significantly from the final map of BRIGAIID Col's. A number of Col's may not prove to provide real added-value to the achievement of BRIGAIID expected impacts and thus, may be discarded whereas new opportunities are also expected to be detected in the future for new effective Col's.

As a conclusion, the BRIGAIID Col's are expected to be formed by an integrated set of actors interested in reducing the current and expected vulnerability to natural hazards in a specific geographic area by facilitating the market outreach and uptake of innovative and operational products and solutions. This goal shall be operationalised through:

- The participation in BRIGAIID demonstration events, and ideally the provision of further support to operational testing of innovations in real environment conditions.
- The identification of the actual needs of end users and the further discussion on how these needs can be translated into clear requirements to be incorporated in the final design of the innovations.
- The support to the dissemination of BRIGAIID results.
- The elicitation of drivers and barriers to innovation in relation to institutions and policies.
- The sharing of experiences and lessons learnt with other Col's and an interest in mutual learning among Col's.

2. Characteristics and aims

This chapter outlines the potential differences among different types of Col's as well as the context of implementation of activities by these Col's. It is important that we take these characteristics into account in order to ensure representativity and potential generalisation of the analysis of generated information and lessons learned.

2.1. Initial planning

A first factor to be considered is whether to promote the establishment of new Col's or to engage with existing ongoing initiatives. The first option allows to plan and control the activities for the Col since these can be 'tailor-designed' and more fitted to the goals of BRIGAIID. Nonetheless, the engagement with other communities having a related aim provides some key advantages. In particular, existing communities are formed by actors having a real interest in collaborating and being active and moreover, these communities are already operating together and possibly have good knowledge on more relevant constraints and limitations. However, the number of operative communities of practice dealing with the promotion of innovation in the fields of Disaster Risk Reduction (DRR) or Climate Change Adaptation (CCA) is limited so in many of the cases is not expected to find an active Col working with a similar scope to BRIGAIID.

As a consequence, BRIGAIID will ideally build an integrated approach by first, promoting the creation of new communities focused on a hazard or a cluster of hazards and second, mapping related initiatives and operational communities in that area and looking for ways to engage and collaborate with these.

The set of BRIGAIID partners and the existing core of end users having expressed their aim to collaborate with BRIGAIID through letters of commitment will be used as initial seed for different Col's (see Table 2). In particular, BRIGAIID partners being potential end-users of climate resilience innovations, i.e. NAAR and AKPT shall be given a central role in the creation of Col's. In addition, the connections to be established during testing activities within the three BRIGAIID innovation cycles (WPs 2-4) and the application of the BRIGAIID's Market Analysis Framework (WP6) should feed the existing Col's.

Table 2. List of End Users that provided a letter of support to BRIGAIID proposal

Country	End User	Signed by	Country	End User	Signed by
Albania	Ministry of Environment	Alqi Bllako	Israel	Peleg Hagalil	E. Schossev
Albania	Ministry of Agriculture	V. Bregu	Netherlands	Ministry of Infra-structure & Environment: Department Climate Adaptation	W.J. Goossen
Albania	Directorate of Civil Emergencies	S. Prençi			
Albania	National Agency of Protected Areas	Z. Dedej	Netherlands	Netherlands Safety Institute	M. Luttik
Albania	Municipality of Lezha	F. Frokaj	Netherlands	RWS	R. Allewijn
Albania	Municipality of Shkodra	V. Ademi	Netherlands	Water board Rivierenland	R. Bleker
Albania	Municipality of Berat	Petrit Sinaj	Netherlands	City of Rotterdam	J. Jacobs
Albania	Inst. of Geosciences, Energy, Water and Environment	F. Hoxha	Netherlands	STOWA	J. Bunstma
			Netherlands	Safety Region ZHZ	C. Post
Belgium	VLARIO	W. Franken	Portugal	ICNF	J. Pinho
Belgium	City of Gent	R. Coene	Portugal	UNCCD NFP	L.P. do Rosário
Belgium	Infrax	R. Bellers			
Belgium	Farys	D. Verbeelen	Romania	Agrozootechnica	T. Ion
Belgium	City of Antwerp	F. Lenders	Serbia	Dutch Embassy Serbia	H. vd Dool
Curacao	Ministry of Economic Development	L. Girigorie			
Germany	StALUMM	K. Sommermeier	Spain	Duero River Basin Authority	J. P. Alonso
Italy	Venice Water Authority	F. Riva			
Italy	Consorzio Venezia Nuova	H. Redi	Spain	Segura River Basin	J.C. González Martínez
Italy	Comune Monterossa al mare	E. Raso	Spain	Murcia's Regional Development Agency	F. Martínez Ferández
EU	EIP-Water Action Group River-Res	C.M. Primo			
Global	World Bank	A. Simpson	UK	UKCIP	R. Street

Our objective is to grow these new Col's through partners and collaborators networks and by liaising with key existing networks around climate adaptation. A first step will be the mapping of past and ongoing related initiatives at a local or regional level. Then, the potential synergies with these initiatives and the opportunities for collaboration are to be identified. In a next stage, a similar analysis may be conducted at a national or even European scale for the identification of other initiatives and communities as a way to get more solid conclusions and support to innovators, to reach a wider audience and to foster mutual learning.

BRIGAIID already cooperates with other H2020 projects for the setting up and enlargement of the Col's, in particular with those integrated into the DRS9 topic, i.e. PLACARD, RESIN, RESCCUE

and EU-CIRCLE. Moreover, the potential participation of this group of projects in the EC's Common Dissemination Booster is seen as an opportunity to strengthen this cooperation and ideally link the Col's activity with main existing platforms on climate change adaptation (i.e. by proving good examples as substantive content) and networks designed to foster innovation (e.g. EIP Water, innovation platforms).

2.2. Segmentation of the context for implementation

The aspiration of BRIGAIID is to develop and support Col's that address the range of hazards covered by the project and operate in areas that are representative of each hazard at an European level. This should guarantee good support to innovators and, as commented before, facilitate a generalised feedback on lessons learnt about the feasibility and effectiveness of Col's.

2.2.1. Thematic segmentation

Innovations are often addressing the risk linked to a specific type of disaster. Thus, the action of a Col is expected to be more effective when linked to a specific hazard. The hazard list for BRIGAIID⁴ (see Table 1.1 of the DoA) which considers 8 separate hazards: River floods, Coastal floods, Droughts, Heavy precipitation, Storms, Hail, Heatwaves and Wildfires. These are grouped into three clusters of hazards: Floods, Droughts and Extreme Weather (see Table 3).

Table 3. List of hazards considered by BRIGAIID

CLUSTERS OF HAZARDS	HAZARDS
Floods	River floods, Coastal floods
Droughts	Droughts
Extreme weather	Heavy precipitation, Storms, Hail, Heatwaves and Wildfires

It is expected that BRIGAIID develops Col's covering most of the hazards. The exceptions may be those hazards that so far have received a lesser number of innovations throughout the BRIGAIID's stocktaking process, i.e. hail or heatwaves.

2.2.2. Spatial segmentation

As defined by the DoA, the results from the market scoping exercise (Task 6.1) is "*direct input for the development of Col's*". Climate change adaptation is often local and context specific and very dependent on the spatial variability of the expected impacts.

As an initial step, we have taken into consideration the work undertaken by ESPON-Climate project (ESPON, 2011). This includes a map of the "typology of climate change regions" which

⁴ The definition for these hazards is provided in the Deliverable D6.1 of BRIGAIID: Market scoping report (see Annex IV).

groups the European regions according to expected changes in eight climate variables, i.e. annual mean temperature, mean number of summer days, precipitation in winter and in summer months, days with snow cover, heavy precipitation, evaporation, and number of frost days. By clustering regions according to these variables, a number of five clusters with different climate change profiles were identified, namely Northern Europe, Northern-Central Europe, Northern-Western Europe, Southern-Central Europe and Mediterranean region (see Figure 2).

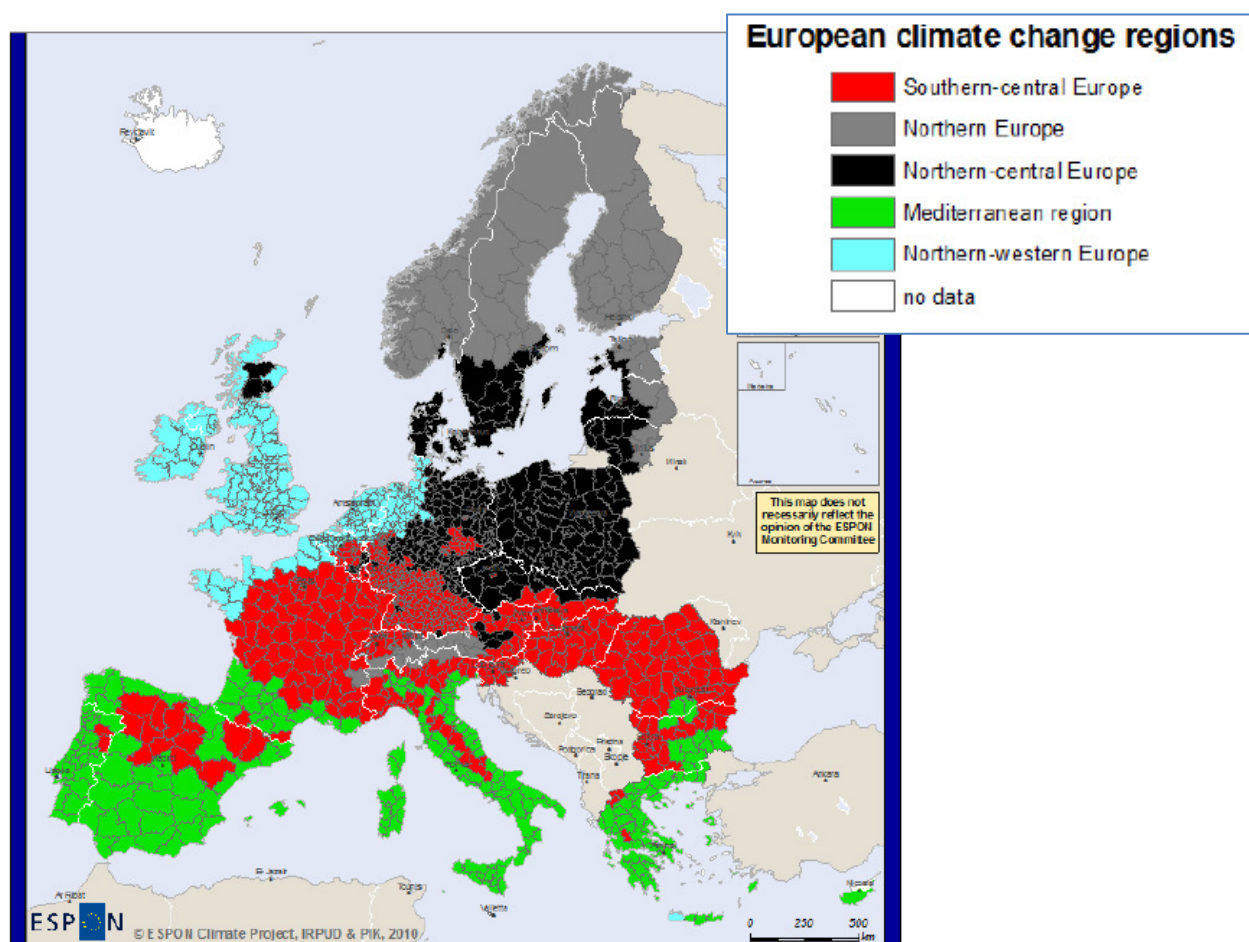


Figure 2. European Climate Change regions (according to ESPON-Climate)

As a second step, we have adapted this classification by considering the seven maps of potential impact for the hazards considered into the market scoping exercise and upscaling the classification from NUTS3 to NUTS2 level (see Annex IV).

As a result, we identify six different regions in terms of expected climatic changes and expected impact from the hazards considered by BRIGAD. The resulting map is shown as Figure 3, and the rationale behind this grouping is summarised in Table 4.

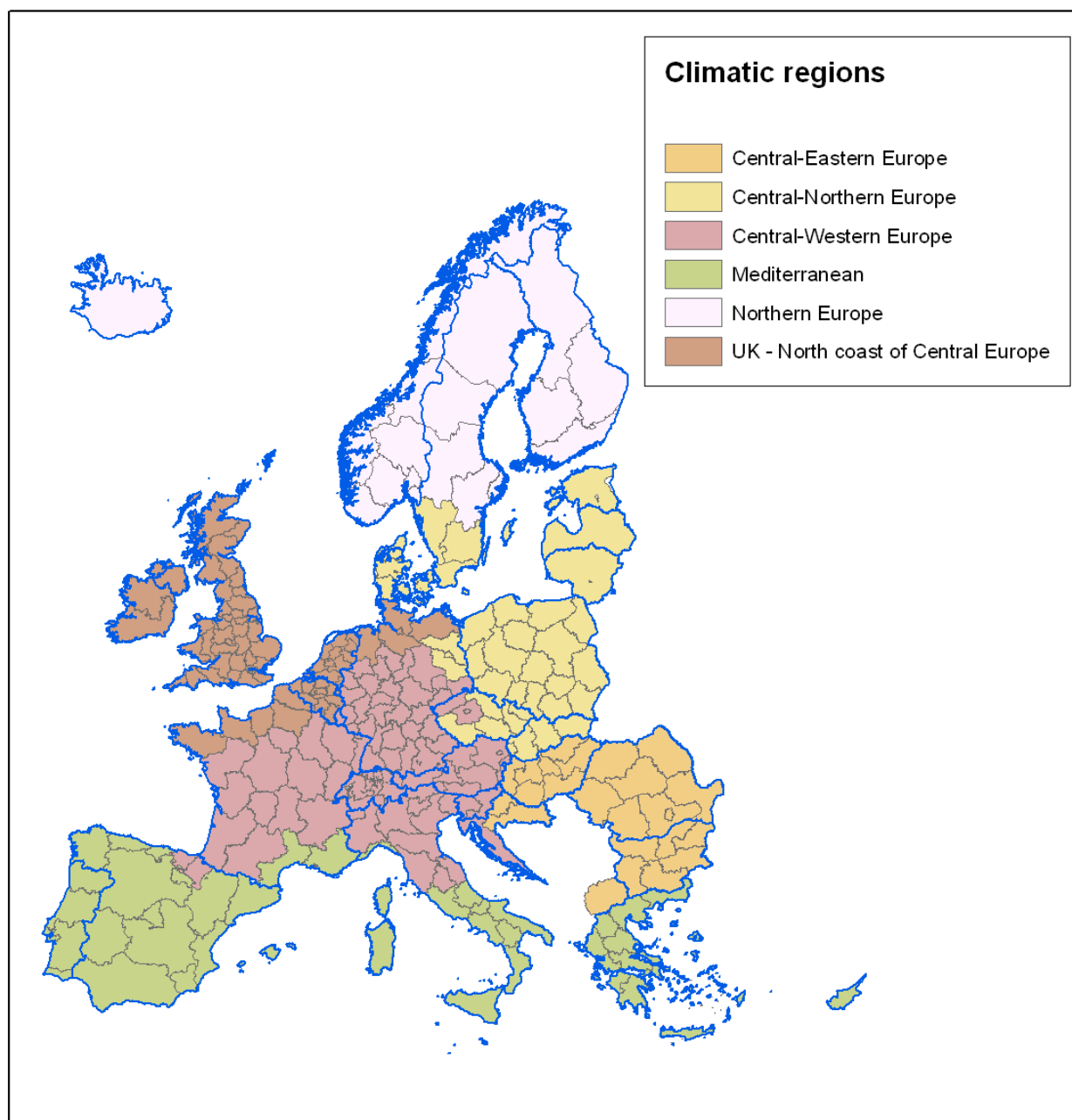


Figure 3. Segmentation of climate change regions based on BRIGAD's market scoping exercise

Table 4. Hazard potential per climatic region (based on BRIGAD's market scoping exercise)

HAZARD	REGIONS					
	Mediterranean	Central Europe	UK - Central Europe North coast	Central – Eastern Europe	Central-Northern Europe	Northern Europe
Fluvial floods						
Coastal floods						
Droughts						
Heatwaves						
Wildfires						
Heavy rain						
Wind storms						



High expected impact (region with hazard potential values in the upper 20%)



Medium-High expected impact (region with hazard potential values between 60-80% of the overall values)

The individualised maps of expected impact per hazard produced as part of the market scoping exercise (see Annex IV) shall be used as support information for identification of optimal locations for Col's at a higher scale.

2.2.3. Stakeholder segmentation

As introduced in the DoA, the Col's aim to include a broad range of actors by considering innovators and innovation catalysts, different types of end-users, involvement of policy or decision makers, public/private sector, financiers and incentives providers, etc.

Table 5. Role of different Stakeholders within a Col

Type of stakeholder	Potential role and interest in the Col
Innovators (start-ups, SME)	Owners of the solutions. They can get useful feedback to create a more grounded innovation, while getting closer access to the market.
End user	Direct beneficiaries of innovations. Support to the development or ideally co-creation of different solutions that will meet their needs.
Policy maker / Decision maker	Provide the necessary incentives, in a broader scale and framework, that will hinder or promote innovation.

Public investors	Closely linked with policy and decision makers, they will incentivize innovation.
Private Investors	Act as Innovation catalysts, lowering the risk of their investment by participating in the innovation process.
Scientific Community (Research Centers and Universities)	Share their knowledge and experience, acting as innovators.
NGO's, Civil Society Organizations	Collaborate with other actors pursuing a social or environmental goal

2.3. Scale of the Col's

A final and relevant factor for the creation of the Col's is the scale of operation. As previously mentioned, adaptation is often a local or regional process that is based on the application of solutions either at regional or at city or municipality level to deal with specific problems at this scale. Hence, the creation of local Col's in a city acting in a similar way to a Living Lab and thus, involving end-users and local communities in the co-creation and exploration of emerging ideas and the polishing of solutions, is one of the expected Col typologies. Moreover, another example of Col falling into the same frame could be built around the actors testing solutions in one specific testing facility.

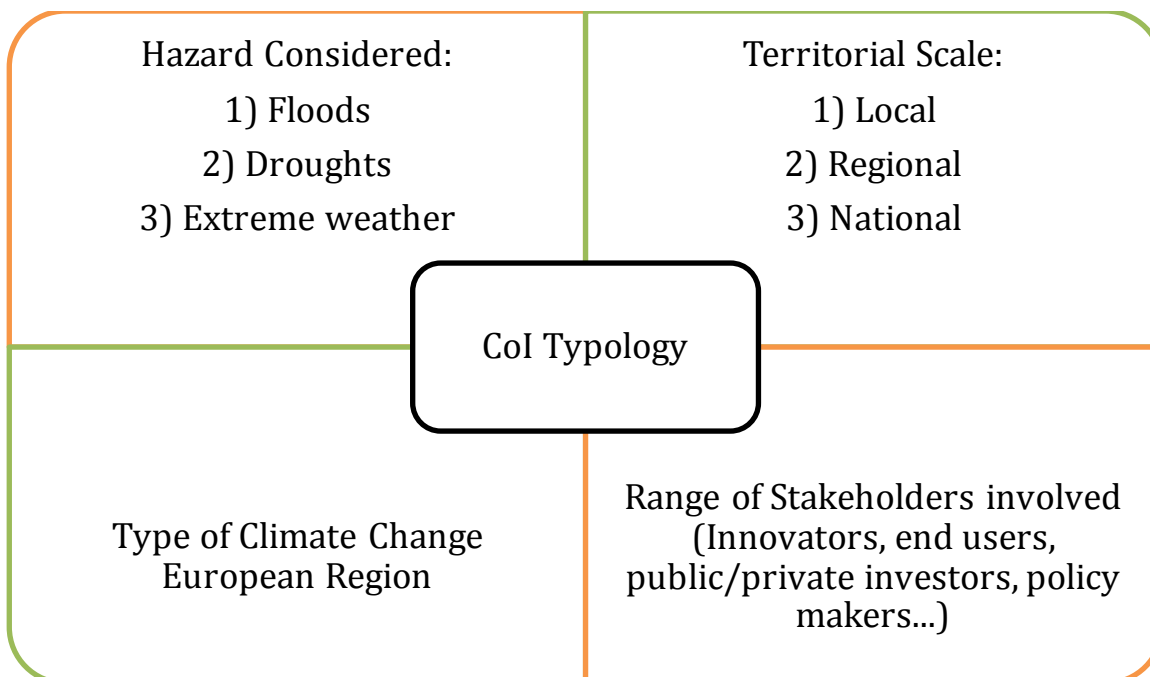
On the other hand, the Col's can operate at a broader scale. For example, national institutions have the potential to drive innovation through a wider resource availability, i.e. national adaptation programmes and strategies, and their capacity to facilitate interaction among stakeholders. A thematic Col operating at regional or national scale as an innovation cluster and supported by a public management body can provide an effective contribution to technology transfer, networking and dissemination of outputs and innovations.

The activity of large scale Col's may follow a top-down approach to inform other actors on the main findings and lessons learnt. This transfer may be more difficult for local Col's which have to follow a bottom-up approach and require the contribution of 'scaling agents' which should facilitate the knowledge transfer to actors operating at a larger scale.

A regional/national Col should usually involve a bigger amount of actors than a local Col and requires a larger critical mass of these to be effective.

BRIGAIID aims to consider local and national Col's which provides an exceptional opportunity to analyse the advantages and constraints linked to the scale of operation of each Col as well as the drivers for the knowledge transfer across actors operating at different scales.

Table 6. Dimensions that will determine the CoI typology under BRIGAIID



3. Activities planned and developed so far

3.1. Role of BRIGAIID partners in the creation and promotion of Col's

The DoA states that all BRIGAIID partners will be involved in the support to the activity of the Col's, e.g. *"The Col's will be established using input from all partners. Based on the characteristics of the Col (location, topic, etc.) partners will join these communities. All partners will participate in the Col's."*

ICA as task leader will coordinate the involvement of BRIGAIID partners in the creation and promotion of the BRIGAIID Col's.

3.2. Synergies with other BRIGAIID activities

There are several activities contemplated in the BRIGAIID workplan that directly underpin and strengthen the interaction with end-users and therefore the action of BRIGAIID Col's:

- Testing of BRIGAIID innovations. Generally, this will be carried out in BRIGAIID test facilities, Living Labs or wherever testing can take place. Any interested end-users may be invited to get involved in the testing activities. In addition to these existing facilities, other facilities may be proposed and used with collaboration of local end-users. Testing covers the technical effectiveness of innovations, insight in the realized risk reduction in socio-economic sectors, post-implementation requirements and operational, organisational and governance needs.
- Demonstration events (WPs 2-4). Once developers (or end users) are satisfied with the test outcomes, the innovations can be demonstrated in events. These demonstrations shall be utilized as a platform for networking and business opportunities.
- Organisation of workshops or specific meetings. BRIGAIID partners may organize specific workshops or a round of interviews involving innovators, end-users and other relevant actors to gain insight in end-users' needs as well as drivers and barriers for the adoption of innovative solutions.
- Outputs from BRIGAIID conferences and organisation of specific side events or activities. The BRIGAIID Col's may take advantage of the attendance of a range of end-users, innovators and investors to the BRIGAIID conferences to organize some specific activities. These conferences will take place at Venice (November 2017), Romania (January 2019) and The Netherlands (February 2020).
- Specific dissemination and communication actions, i.e. conferences, social media, support through the Climate Innovation Window.

- Application of the Market Analysis Framework (MAF+) for the identification and segmentation of target end-users.
- Sharing experiences and lessons learnt among Col's.

3.3. Tentative BRIGAIID Col's

A number of BRIGAIID Col's are already emerging as a result of the activities being conducted by BRIGAIID partners (see section 3.2). In addition, there are another Col's that are planned to be pushed forward by some other partners in the near future. This process for the definition of Col's have been supported by previous activities mainly developed in BRIGAIID consortium meetings, e.g. workshops on end-user involvement in Berlin meeting in May 2017.

All these are considered as the “frontrunner Col's” and provide a good representation of the different possibilities for the development of Col's in terms of hazards considered, scale of application and climatic regions in terms of expected impacts and changes (see Table 5 and Figure 4).

Table 5. Tentative BRIGAIID Col's starting their activities in 2017

Col	HAZARDS considered	SPATIAL DOMAIN	Climate Change region
Albania	Multi-hazard	National	Eastern Europe / Mediterranean
City of Antwerp	Heavy rain	Local	Central Europe / UK – Coastal central Europe
Facau polder (Romania)	River floods	Local – although scalable to national scale	Eastern Europe
Netherlands	Floods (river and coastal)	National	UK – Coast of central Europe
Portugal	Wildfires	National	Mediterranean
Spain	Droughts / Flash floods	National / Regional	Mediterranean
Venice region	Coastal floods	Local	Central-Western Europe

As an overview of the distribution and segmentation of the “frontrunner Col's”:

- There are several initial scales of operation for the BRIGAIID's Col's:
 - There are three Col's that are designed to operate at national scale, i.e. The Netherlands, Spain and Albania. These cover hazards that generally need to be managed at a broader scale: floods and droughts.

- The Portuguese Col deals with wildfires and shall operate at a regional/national scale.
- The Venice Col is designed as a local/regional initiative
- The Romanian and the Antwerp Col's are initialising their activities at the local scale, i.e. city and controlled environment test-site.
- Most of the Col's will intend to transfer their activities to a different scale of operation:
 - The Albanian and Spanish Col's will explore the downscaling of their activities into regional level.
 - The two Col's operating at local scale will explore potential actions useful at a regional level.
- The “frontrunner Col's” deal with five different hazards: river floods (Netherlands, Romania, Albania), coastal floods (Venice, Netherlands), droughts (Spain, Romania, Albania), pluvial floods (Antwerp, Netherlands, Venice), and wildfires (Portugal).
- All these Col's will initiate new communities although some of them aim to engage with other existing communities, e.g. The Netherlands and Spain.
- In all the cases, a wide range of different actors and stakeholders are being contacted for their inclusion into the Col's.

MAPPING POTENTIAL EMERGING COI's IN BRIGAIID

1. **Netherlands.** National / Floods?
(HKV / TU Delft)
2. **Antwerp.** Local / Heavy rain
(KU Leuven)
3. **Portugal.** National / Wildfires
(ISA / GIFF)
4. **Spain.** National? / Droughts & Fast floods (ICA / FW)
5. **Venice.** Local / Coastal floods
(THETIS / DAPP)
6. **Facau test polder.** Local although scalable to national / River floods (NAAR)
7. **Albania.** National / Multihazard
(AKPT)

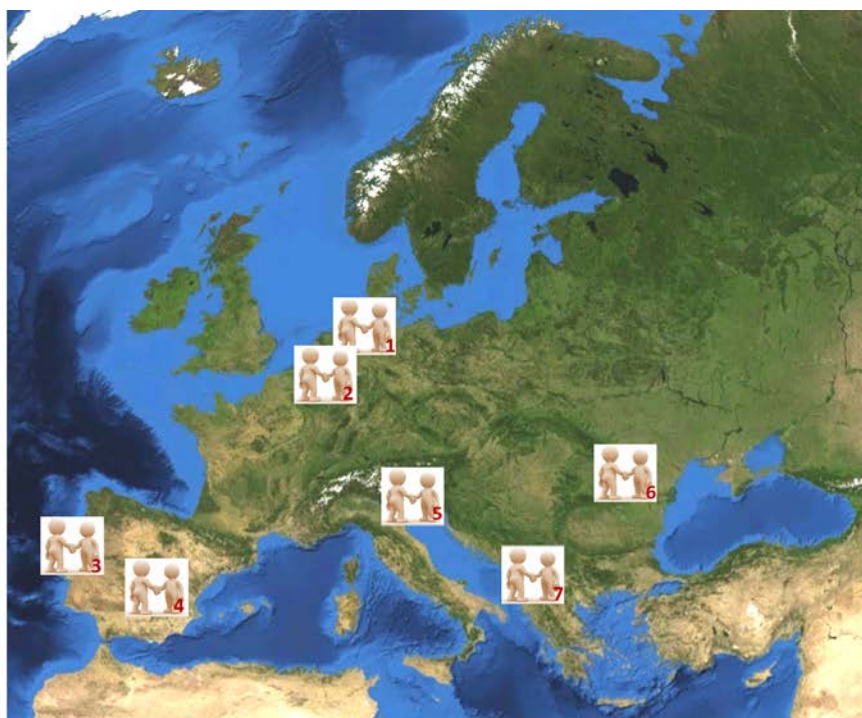


Figure 4. Map of emerging Col's in BRIGAIID as for 2017

It must be noted that this is not a closed list and that other Col's may be organised in the next months or that some Col's are not becoming active as input from organisation outside BRIGAIID is lacking.

3.4. Expected activities of BRIGAIID Col's

This section explains the general objectives and structure for each Col. Here, also the activities that have been undertaken or are currently in progress are explained and those to be conducted or explored in the future are indicated.

3.4.1. Col in Albania

The Albanian Col is organised by the a BRIGAIID partner (AKPT) which is the Albanian National Territorial Planning Agency (NTPA). This Col will act a a national scale and aims to deal with risks related to floods, droughts and extreme weather.

A kick-off "First National Meeting" was organised by NTPA for building stakeholders network in the framework of BRIGAIID in Tirana on 21/04/2017.

The meeting had a turnout of about 80 guests and was honored by the Albanian Minister of Urban Development Mrs. Gjermani and the Ambassador of the Netherlands in Albania, Mrs. Dewi van de Weerd.



Following are listed some of the organisations represented in the meeting:

- Representative of line ministries: Ministry of Environment, Ministry of Agriculture, Rural Development and Water Administration, Ministry of Energy and Industry, Ministry of Urban Development, Directorate of Environmental Protection, Directorate of Biodiversity and Protected Areas, General Director of Water Administration, National Secretariat/Committee for the Big Damps, General Directorate of Natural Resources Development Policies, Albanian Geological Services, National Agency of Natural Resources, National Environmental Agency and Regional Environmental Agency, Institute of Geoscience, Environment, Water and Energy (former Institute of Hydrometeorology), Technical Secretariat of the National Water Council, Civil Emergencies, Water - Supply

enterprises/utilities, Albanian Regulatory Authority of the Water Supply and Waste Water Disposal and Treatment Sector, ASIG Geoportal Albania, Tirana Municipality, etc.

- Representatives of science, academic institutions, NGOs, donors representatives, and private companies: Faculty of Civil Engineering, Center of flora and fauna studies, Agricultural University of Tirana, Albanian Energy Association of Albania (AEA), iC-Group, Plan- Consult, The Institute for Nature Conservation in Albania (INCA), Albanian Centre for Energy Regulation and Conservation – ACERC, Eco Movement, Regional Environmental Center (REC), Foundation for Local Autonomy and Governance (FLAG), Milieukontakt Albania, Protection and Preservation of Natural Environment in Albania (PPNEA), EDEN Centre, UNDP, GIZ, USAID, OSCE, Albania - KfW Entwicklungsbank, Customeyes, Co-Plan Albania, GDi GISDATA, Meteoalb Albania, Gjeo-Vjosa, IMB (Institute of Business Modelling), etc.

The meeting was held in the framework of the promotion of BRIGAIID project for Building the Stakeholders' Network. One BRIGAIID partner attended, Thetis SPA, presented "The Toolkit Method (TM), from the safeguard of Venice to a general approach for the protection of urban historical settlements from flooding". The meeting highlighted the project objective and end user benefits being part of this initiative.

The guests attended at this meeting were informed about the project through the presentations and the dissemination materials put in their disposal.

The meeting concluded with questions and interests of the stakeholders for a further collaboration on behalf of BRIGAIID project. Specifically, the stakeholders showed their contribution and development opportunities. For instance, stakeholders responsible for database networks or digital platforms showed their possibility to support with existing data and available to create new ones. While end users showed their necessity in conformity of our national civil emergency and solution to solve these emergencies, as well as they request for an authority right reserve for innovation ideas coming out on behalf of this project.

Many of the actors involved in this meeting are interested in getting engaged in the BRIGAIID Col. As an overview, the expected core actors for the Col are: i) Civil Emergency; ii) Administrative Units (Berat, Shkodër, Lezhë, Tiranë); iii) Public Universities (University of Durrës "Aleksandër Moisiu", Polytechnic University of Tirana, University of Shkodra "Luigj Gurakuqi", University of Mining and Geology in Tirana); iv) Public institutions (Line Ministries, Agency of Research Technology and Innovations, IGEWE); and v) innovators, e.g. companies with business profile in environmental consulting and with profile in applications' development.

As a follow up of this meeting, a series of activities will be implemented or explored:

- Albania is classified as an operational test site in BRIGAIID project and thus, testing is expected to be a core activity for the Col.

In the next months, NTPA is planning to organize testing/promotion activities for BRIGAIID innovation product in a potential test site in Albania. Ideally, it is expected that this activity will be attended by: BRIGAIID partners, innovators, national end-users, companies, research units (public and private), universities representatives as well as students.

An important point will be promoting/marketing these test events. This will be undertaken by publishing the event in the NTPA's electronic platform and informing the current list of contacts about the agenda and the program. These events are intended to be livestreamed and this will be accompanied by other dissemination actions.

- Albania, as an operational test site would be an attractive environment to demonstrate innovations from BRIGAIID partners. In this kind of activity NTPA will contribute in organisation and dissemination. NTPA will identify and invite institutions, companies interested for business opportunities developing as well as individuals, universities interested for further researching.
- In the framework of BRIGAIID project, NTPA plans to organise workshop/s with a specific thematic scope to promote BRIGAIID and its innovations products, e.g. specifying in more details the usage of some products. In this workshop/s we expected to invite project innovators as well as national innovators. Furthermore, this organization we expected to be attended by representative of civil emergency, administrative unit's representative, universities representative, research units and enterprises.
- NTPA also expects to contribute to the BRIGAIID international conferences by sharing the experience gained in the Albanian Col.

3.4.2. Col in the city of Antwerp (Belgium)

This Col is being developed on the city of Antwerp (Belgium) and deals with urban flooding due to extreme weather, in particular due to extreme precipitation and heat stress.

This Col is being led by a BRIGAIID partner, e.g. KU Leuven. It currently incorporates four municipal departments of the city of Antwerp:

- Ecological Management unit: responsible for the ecological management of the city;
- Climate Adaptation unit: responsible for the implementation of climate adaptation plans;
- Water Management unit: responsible for the flood management of the city;
- Emergency Planning unit: coordinating the emergency planning of the city.

Other key actors are:

- Water-link, which is company responsible for the sewer system management;
- Le Prieuré / Vegetal i.D., which provides an innovation named HYDROVENTIV that works as a smart green roof system;
- Fire Brigade: responsible for the urban flooding, wind storm and other extreme weather related interventions; they also conduct post-event surveys;
- Regional Traffic Centre: responsible for the traffic management of the region, providing traffic information to the wider public;
- Police of Zone Antwerp: responsible for the law and order of their citizens, which may be impacted by urban floods, such as the impacts on the traffic; they have to facilitate evacuations, etc.;

- National Defense Belgium: same as Police but for larger event to be coordinated nationally such as evacuations;
- Regional Defense Province of Antwerp: same as Police but for larger event to be coordinated regionally such as evacuations;
- Main hospitals: they will receive the victims of the extreme weather events; they may not be accessible or more difficult to access in case of an urban flood in the city;
- Main schools: large groups of students affected at the same place in case of an urban flood; they cannot reach the school or their home place in case of an urban flood in the city;
- Main elderly homes: large groups of elderly people affected at the same place in case of an urban flood; they may not be accessible or more difficult to access in case of an urban flood in the city;
- Federal Health Institute: responsible for the regional health management of the citizens;
- Association of Cultural Heritage Exploitants: representing the cultural heritage owners and exploitants; the cultural heritage in the city may be impacted by urban floods;
- Local citizens of city area Sint-Andries.

The city has suffered some severe episodes of pluvial floods, the most recent in May 2016. According to the indicator of hazard potential calculated in the market scoping exercise, the city is located in an area of high exposure, and events of intense precipitation that are expected to increase due to climate change.

The Antwerp Col is structured as a “Living Lab” with a strong involvement of end-users and local citizens. So far, this collaboration is focusing on the testing of innovations helping to reduce the effects of heavy rain.

The HYDROVENTIV innovation (see <http://climateinnovationwindow.eu/innovations/hydroventiv>) has been selected to initiate this testing. The city of Antwerp actively helped in finding a test location for the HYDROVENTIV smart green roof system (to be tested within the scope of BRIGAIID). They launched an open call to their citizens, announcing the BRIGAIID plans and asking for citizens who are willing to make their roof available for the testing. The call and BRIGAIID testing activities were announced on their website⁵.

More than 10 citizens expressed their interest to make their roof available for the BRIGAIID testing. Together with the innovator, all these potential test locations were studied, the best

⁵ <http://stadslab2050.be/klimaatadaptatie/intelligente-groendaken/een-intelligent-groendak>

<http://stadslab2050.be/klimaatadaptatie/klimaatrobuust-een-verkenning/maak-kans-op-europese-steun-voor-jouw-innovatie>

locations visited and a final choice made on the best test location: the Beweging.net building at the Nationalestraat 111, Antwerp (see Figure 5).

LOCALIZATION – EXPERIMENTAL BUILDING

Antwerp city center – St Indres district
Nationalestraat 111
Beweging building

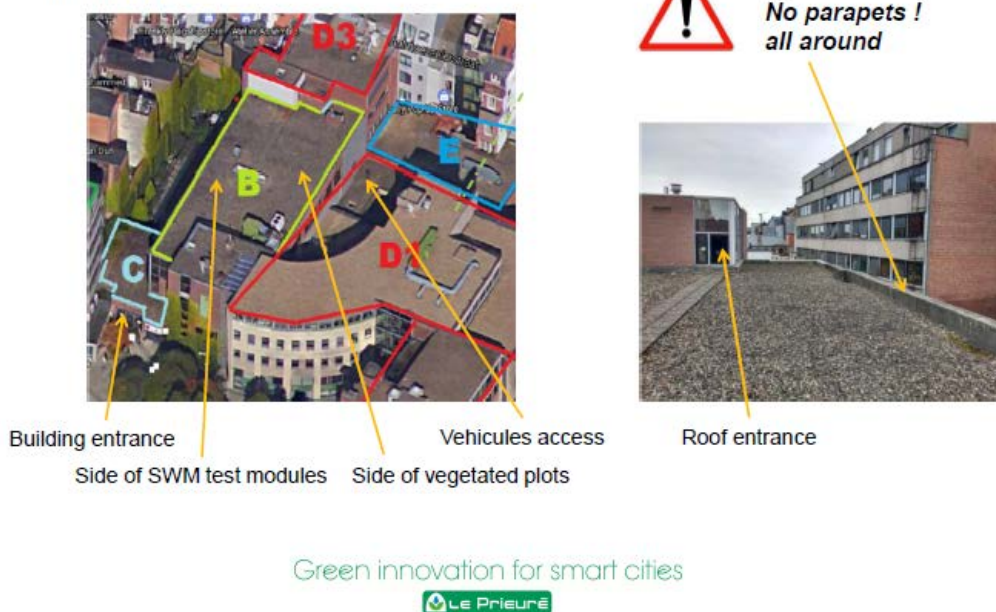


Figure 5. Testsite for HYDROVENTIV in Antwerp

It is agreed together with the city of Antwerp that KU Leuven will conduct the testing together with the innovator and that KU Leuven will upscale the results to a larger area based on a hydrological and hydraulic simulation model.

The installation and testing of the smart green roof system is considered by the city of Antwerp as an opportunity to make local and regional promotion around sustainable (blue-green) solutions to cope with the negative effects of climate change. The green roof system will be considered as one of such solutions. Local promotion events will be organized and delegations from other cities and events will visit the test location.

At a later stage (e.g. spring 2018), after the HYDROVENTIV system has been installed and first test results obtained, it is intended to organize a local event to promote and disseminate the BRIGAIID testing activities and innovation. This would be done in cooperation with the city of Antwerp.

The BRIGAIID testing on the HYDROVENTIV innovation will be considered for demonstration purposes. As explained before, KU Leuven will upscale the results from the local test site to a

larger area. This will be of direct support to the local and regional urban water management. Most likely, this can be utilized as a unique opportunity for networking and dissemination (drawing attention to the need for sustainable blue-green climate adaptation solutions; promotion of the innovations being tested; impact analysis and planning based on upscaled results). Whether this will also provide a business opportunity has to be checked at a later stage; BRIGAIID will in any case support the business opportunities of the innovators. In relation to this, the involvement of Antwerp Col in the BRIGAIID conferences to share the main findings and lessons learned is an activity that will be explored.

Maybe at a later stage of the BRIGAIID project (cycle 2 or cycle 3 of the project) other BRIGAIID innovations will be tested in the same area of the city of Antwerp. In this way, clusters of innovations can be considered there.

It is already agreed with the Emergency Planning department of the City of Antwerp that BRIGAIID will explore the opportunity to develop a service to cope with the negative impacts (e.g. more frequency and more severe urban flooding) that the changing climate will bring.

A first activity is already being planned for 27 October 2017: a workshop with several stakeholders discussing the needs for the emergency planning in the city of Antwerp.

3.4.3. Col in Romania

The initial activity of this Col shall pivot around the possibilities offered by Flood Proof Romania. This is new testing facility that is being constructed by our partner NAAR in Romania, in the locality of Facau. Flood Proof Romania aims to support an innovation hub around floods protection for the Danube region.

The facility offers a unique opportunity to develop, test and demonstrate innovations that aim to reduce impact from floods. It is especially suited to test and monitor innovations under high speed water flows as they appear during flash floods and landslides, and under extreme cold and hot land climate conditions. Moreover, the facility remedies the urgent demand for test facilities that are needed to structurally develop, test and demonstrate innovations in the Eastern European region.

Flood Proof Romania is a downstream of 13 m high dam; equipped for testing of high structures (over 3 meters high dikes). Water flowing at high speeds as this appears in mountainous areas. Due to land climate exposure (cold winter and dry hot summers) also drought and heat related solutions can be tested.

NAAR is a BRIGAIID partner and will lead this Col. NAAR represents the Romanian National Authority, which is aimed at applying the national strategy in the field of water management and turning to good account, as well as management of the national network of hydrological, hydrogeological and quality of the water resources belonging to the public domain. Therefore, NAAR has an outstanding position for the organisation of test events involving the main actors to be represented in the Col.

Additionally, NAAR aims to organize presentation (show case) and demonstrating of innovations events for innovations mitigating floods, droughts and extreme weather. NAAR will have an

important role in results dissemination process and implementation of general project results in local government.

The activities of the Romanian Col will be better defined once the Flood Proof Romania facility starts the construction phase. An effort of 10 persons-month is allocated to NAAR in WP7 for the implementation of these actions.

3.4.4. Col in the Netherlands

The Dutch Col will primarily deal with floods and will be led by HKV and TU Delft. It aims to engage public authorities, i.e. Delfland Water Board, STOWA, Ministry of infrastructure and environment, as well as innovators.

The Col will focus on the organisation of workshops and small events to gain insight on end-users' needs as well as drivers and barriers for the adoption of innovative solutions.

A first event was organised with end users in the Netherlands to update them on the activities and progress of BRIGAID so far as gain insight on end-users' needs as well as drivers and barriers for the adoption of innovative solutions well as to inform them on the innovations that BRIGAID promotes. The event, held on the 15th of June 2017 was a first step towards a BRIGAID's Community of Innovation in the Netherlands.

Participants came from public authorities (including representatives from municipalities and ministry of Water and Environment) and a meeting was organised at Delft University of Technology. An overview of BRIGAID was presented and a representative from KU Leuven presented the concept of the Hydroactive smart roof and how the city of Antwerp is involved in testing this innovation in a Living Lab. Then the TubebARRIER innovation was presented and it was explained why they have got involved with BRIGAID. Finally, Bas Jonkman, the BRIGAID scientific coordinator, stressed the importance that end user and innovators should meet each other and work together within BRIGAID.

After the meeting, a visit was made to Flood Proof Holland, a testing site at the University. At the polder, the participants witnessed how the TubebARRIER is tested in conditions similar to real flooding.

The Col plans to organise such events again, but also to liaise with ongoing activities of end users (including water boards) and, when possible, be present at their meetings to inform them and through that engage them with BRIGAID.

In addition, the organisation or participation in demonstration events and/or in test events, either in BRIGAID test sites or in end-users' facilities, will be explored. These activities will be combined whenever possible with the workshops or end-user events.

Finally, a number of other Col's with similar objectives (or at least in the field of climate adaptation) emerge every now and then. Where possible the Col would like to participate in those as well, to highlight BRIGAID.

3.4.5. Col in Portugal

The Portuguese Col is focused on wildfires and aims to operate either at a regional or national scale. It will be organised by two BRIGAIID partners, the Institute of Agronomy (ISA) and GIFF. Both are involved in BRIGAIID mainly as innovators.

The activity of this Col shall focus on testing activities for innovations related with wildfire risk reduction or recovery after a fire event. These activities will aim to evaluate the effectiveness of the prescribed burning technique and fire treatments.

The involvement of end-users in these events is a key part of the activity. In particular, forest services (ICNF) and Forest Owners Associations have already been approached for their participation in these activities. Also, representatives of the municipalities where test sites are located will be contacted.

As a potential continuation of the testing activities, the organisation of demonstration events shall be explored.

3.4.6. Col in Spain

I-CATALIST (ICA) will lead this Col. The Col in Spain aims to develop a broader methodological approach that can be useful for other Col's. This action is connected with the research methods being applied by the H2020 project PLACARD. Indeed, the DoA reflects the rationale followed by this approach: *"In setting up these Cols, BRIGAIID intends to cooperate with other H2020 projects. In particular, PLACARD which is a Horizon 2020 Coordination and Support Action that seeks to support the coordination of Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR) for coherent, mutually reinforcing and pragmatic planning and action."*

In the BRIGAIID's progress meeting in Berlin, PLACARD's scientific coordinator introduced the main advances of this initiative. After an analysis of potential synergies and common actions, BRIGAIID has come across with the idea of replicating in Spain the social network analysis that PLACARD has undertaken for some European countries. After consultation with PLACARD, it has been agreed that this collaboration is of interest for both initiatives. As an additional benefit, this joint action will help to further populate the PLACARD's database of European actors on CCA and DRR. This database has already been shared with BRIGAIID for dissemination and communication purposes.

The PLACARD's social network analysis is focusing in the specification of climate change adaptation and disaster risk reduction actors and the elicitation of the intensity in the relationships among these actors in terms of different variables.

As a first step, ICA will identify the main actors in CCA and DRR in Spain. PLACARD has developed a questionnaire to interview the different actors that will be translated into Spanish by ICA. ICA will contact with the identified actors and will be responsible of collecting the answers and organising some interviews, if needed. Using this information, ICA will elaborate an input file for the analysis, which will be undertaken by PLACARD.

As a next action, ICA will contact the main actors, e.g. those identified by the network analysis, and will organize an action, i.e. small workshop or specific meetings, for the validation of the results. Also, BRIGAIID will discuss with these main actors what strategies could be designed based on the network analysis results for an enhanced involvement of end-users in the adoption of climatic resilience innovations. Taking into account the distribution of roles of the different BRIGAIID Col's, it is planned to focus the analysis on droughts also considering that the current and expected potential impacts of this hazard in Spain are the largest across Europe.

Our commitment is to further explore the potential operationalisation of these strategies into some specific activities. In particular, an initial idea to be explored is the definition of activities related to the reduction of the adverse effects of droughts in South-Eastern Spain. This happens to be the area most affected by intensive droughts in Spain and also with a highest vulnerability due to the importance of intensive irrigated farming and the current structural situation of water scarcity.

Another BRIGAIID partner, i.e. FutureWater would support ICA in this potential downscaling of the Col activities.

3.4.7. Col in Venice area (Italy)

On 9th and 10th November 2017, BRIGAIID is organising an international conference in Venice. This conference sets the conclusion for the BRIGAIID's first innovation cycle through an event to promote innovations, to connect with end-users and to disseminate BRIGAIID's findings.

The conference focuses on the involvement of end-users in the process of final development and market update of climate-resilience innovations, e.g. through a discussion about how BRIGAIID's innovations can support end-users and how end-users' needs can drive BRIGAIID innovations' scouting and implementation processes. Thus, the central point of the event is the analysis of end-user involvement in the innovation chain.

This has been considered as a very valuable opportunity to facilitate the development of a Community of Innovation in Venice connected to BRIGAIID.

Our partner Thetis SpA is the main organizer of the conference and furthermore is part of the group of innovators of our consortium. This puts Thetis in an ideal position to facilitate the development of this Col.

The Col shall focus its activity on the flood hazard in Venice city although the scope could be extended to the broader Veneto region and indeed to the Italian Eastern Alps basin. Furthermore, the extreme weather events could also be incorporated.

A list of reference actors has already been identified for this Col:

- The Provveditoriato Interregionale alle Opere Pubbliche (Venice Water Authority) is considered as the central actor for this Col due to its central responsibility in the risk reduction against flooding. This body will actively take part into the BRIGAIID conference.
- Other core actors to be engaged into BRIGAIID Col are: Consorzi di Bonifica, Eastern Alps River Basin Authority, Protezione Civile, ARPAV (Regional Environmental Agency), Genio

Civile Fiumi, Consiglio di Bacino, Città Metropolitana di Venezia, OICE Veneto (Engineering and Architectural Professionals organizations)

- Finally, there are some other actors to be contacted, i.e Universities (I.U.A.V., ca' Foscari, Padova), Adriatic Sea Port Authority, Corila (Consortium for coordination of research activities concerning the Venice lagoon system), National Research Council, Veritas SpA, Insula SpA.

Many of these actors will learn on first-hand at the conference about the BRIGAIID methods and how these are applied to guide the development of innovations. Furthermore, the conference should facilitate the identification of the main needs and potential drivers for the adoption of innovations dealing with a better protection against flooding and extreme weather in the Venice area. All this combined information shall be a key input into the design of testing activities in the city/region.

The Venice area is one of the locations part of the network of BRIGAIID test sites. This means that the testing in an operational environment of innovations for the protection of urban monumental and cultural heritage and/or the organisation of some kind of related demonstration event is going to be explored in the frame of the project. In relation to this point, there is a possibility to restore and adapt an experimental site owned by Venice Water Authority (Centro Sperimentale di Volta Barozzo).

As a support to the development of the activities, the organisation of one or more workshops or the planning of round of interviews with some core actors will be explored.

3.5. Monitoring the activity of BRIGAIID Col's

This document, i.e. D7.8 on the design of Col's, is directly linked with two other BRIGAIID deliverables:

- The D7.9 'Intermediate report on the activity of communities of Innovation' to be issued at month 33, i.e. January 2019.
- The D7.12 'Final report on the activity of communities of Innovation' to be issued at month 48, i.e. April 2020.

These two other deliverables will set describe the activities performed under the umbrella of each Col and analyse the outputs produced. Also, the fulfilment of the commitments expressed in this document shall be monitored and any deviation from the current plan in terms of activities and objectives shall be explained and justified.

3.6. Replication of activities and mutual learning

After reviewing a few experiences of different Col's, Lippitz et al (2012) summarizes what defines a Col, and include two points directly related to the learning component:

- Focus on learning and building capabilities to manage innovation and entrepreneurship, versus seeking specific business, macroeconomic or social results

- Emphasize sharing and mutual learning among regularly involved participants from diverse organizations, industries and/or countries, toward building trust and relationships, as opposed to largely one-way instruction, as in training classes.

By taking into consideration this approach, BRIGAIID will look at two separate levels at the learning process produced as a consequence of the direct interaction of different actors within the Col's:

- Internal learning produced within each Col valuable to manage and foster innovation
- Mutual learning among Col's and identification of issues to be considered to facilitate a potential replication of activities from one Col to another, e.g, analysis of what worked well and what did not. In order to achieve this replication, the differences and commonalities in the context of each Col shall need to be determined and taken into account.

The BRIGAIID meetings and in particular, the BRIGAIID conferences are seen as an interesting opportunity to promote mutual learning activities. These should gain some importance in the final stages of the project.

ANNEX I. List of abbreviations

CCA:	Climate Change Adaptation
Col:	Community of Innovation
CoP:	Community of Practice
D:	Deliverable
DoA:	Description of Actions document, annex II to BRIGAIID Grant Agreement
DRR:	Disaster Risk Reduction
FP:	Framework Programme
H2020:	Horizon 2020
M:	Month
MIT:	Massachusetts Institute of Technology
NGO:	Non-Governmental Organisation
NUTS:	Nomenclature of Territorial Units for Statistics
PU:	Public
R&D:	Research and Development
SME:	Small/Medium Enterprise
UK:	United Kingdom
WP:	Work Package

ANNEX II. List of references

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ANNEX III. Examples of Col's

Many innovation initiatives have been promoted during the last years, in different organizational and institutional forms. This annex presents some of these initiatives as a means to gain insight and look for lessons learned that in the future may be taken into consideration by BRIGAD.

<p>Host: Government.</p> <p>Funding: Government or business</p> <p>Focus: Business</p> <p>Government-sponsored agencies that foster collaboration among businesses and connect them to academia and government</p>	<p>Nordic Innovation, a subsidiary of the intergovernmental Nordic Council of Ministers, stimulates innovation and promotes the Nordic region as an innovation hub in a number of ways: funding and publishing research, facilitating public-private partnerships and fostering learning and networking between companies. For instance, the Measured and Managed Innovation Programme (MMI) brings together 100 companies to learn about increasing the effectiveness of their innovation efforts.</p> <p>The Colorado Innovation Network (COIN) was launched in November 2011. COIN's mission is to stimulate local economic development by fostering collaboration among leaders from federally funded research labs, higher education institutions, government and community organizations, industry partners and growth companies, as well as high-growth entrepreneurs.</p>
<p>Host: University</p> <p>Funding: Govt., business or nonprofit</p> <p>Focus: Business</p> <p>University-led groups where executives share case studies and lessons in innovation and entrepreneurship management and implementation</p>	<p>The Cardiff University Innovation Network, formed in 1996, is an example of the first form of university-led InnoComm. Housed within the university's Strategic Development Directorate and funded in part by the Welsh government, it serves as a noncompetitive, neutral space to solve problems and support cross-sector innovation among local businesses and between these businesses and the university</p> <p>Berkeley Innovation Forum at the Haas School of Business, University of California at Berkeley. Since 2003 it convenes a group of 10–12 companies in an idea-sharing forum. Membership in the Innovation Forum, which costs companies \$10,000 per year, includes two two-day Forums, two briefing sessions, and access to online materials, related workshops, new research from Chesbrough's Center for Open Innovation and other relevant innovation research at Berkeley. Companies that participate in the Innovation Forum cannot be direct competitors (unless the prior competing member assents to the inclusion of a competitor).</p>
<p>Host: Business</p> <p>Funding: Business</p> <p>Focus: Business</p> <p>Business executive groups that share best practices in innovation management</p>	<p>The Club de Paris des Directeurs de l'Innovation was created in 2008 as a pan-European forum—the members are not just Parisian or French—for research, sharing of experience and networking on innovation and entrepreneurship management. Club de Paris is the core of a broader group that meets annually for two days, as well as an even broader group of about 5,000 innovation professionals. Full membership in the Club costs €8,500 per year for six half-day meetings, six breakfast meetings, two operational/thematic workshops and the annual meeting</p>
<p>Host: Nonprofit</p> <p>Funding: Govt., business or nonprofit</p> <p>Focus: Business</p> <p>Nonprofit organizations that promote</p>	<p>The Massachusetts Institute of Technology (MIT) Venture Mentoring Service (VMS) is an organization that provides a free matching service between entrepreneurs that have a MIT affiliation and volunteer mentors who have applicable start-up or functional expertise. Its mission is "to support entrepreneurial activity within the MIT community and thereby, to further the educational mission of MIT." By prioritizing education over commercialization, VMS is distinct from traditional incubator or accelerator programs focused on</p>

sharing of business-building skills among independent entrepreneurs	<p>funding and concept-to-commercialization processes</p> <p>The Honey Bee Network is a global network of innovators, academics, policy makers, farmers, entrepreneurs and NGOs that discover, share, incubate and commercialize grassroots innovation across its seventy-five member countries. Members of the network in India, where it was founded, journey to different rural regions to hold community workshops and discover local innovations. To formalize technology transfers and build a knowledge center, the Honey Bee Network works in conjunction with other entities such as the National Innovation Foundation (to engage government stakeholders), the Society for Research and Initiatives for Sustainable Technologies and Institutions (to document discoveries and protect intellectual property) and Grassroots Innovation Augmentation Network (a venture fund and incubator).</p>
<p>Host: Govt. or nonprofit</p> <p>Funding: Govt. or nonprofit</p> <p>Focus: Govt. or nonprofit</p> <p>Groups of government or nonprofit organizations that share innovation</p>	<p>The Urban Sustainability Director's Network (USDN) is an engaged network of North American city and county sustainability directors dedicated to collaborative activities and knowledge-sharing that will advance the field of urban sustainability. USDN was formed in April 2009, when municipal sustainability leaders recognized that local governments were solving similar cross-cutting sustainability issues in geographic silos, without a forum to collaborate, to share best practices or to partner. Members must actively participate in a USDN committee, working group, user group or regional network and must honor USDN's policy of creating a safe space for exchange.</p> <p>Mistra Urban Futures is a research center based in Gothenburg, Sweden, that focuses on sustainable urban development. The center employs a nontraditional approach to research, creating reality-based, localized research and "Interaction Platforms" (IPs) that provide a foundation for local civic officials, businesspeople and academics to work together on solutions to problems of urban development and consumption, with a strong emphasis on knowledge-sharing.</p>

Table 1. Types of Communities of Innovation, according to who hosts, funds and Col focus (Source: Lippitz *et al*, 2012)

There are some initiatives of Communities of Innovation promoted at European level on Climate Change Adaptation. This is the case of European Institute of Innovation and Technology (EIT) [Climate KIC](#) (Knowledge and Innovation Community).

How do KIC work:

- High degree of integration: each Innovation Community is organised around an independent legal entity, gathering world-class Innovation Community partners from all the innovation dimensions. The EIT does not address education, research and innovation independently but instead simultaneously, as constitutive elements of a single innovation chain, to deliver incremental and disruptive innovation.
- Long-term perspective: each Innovation Community is set up for a minimum of seven. It ensures that the Innovation Community is able to focus on short-, mid- and long-term objectives, remaining agile enough to adapt to emerging needs from the field in which they operate.
- Efficient governance: strong leadership is a pre-requisite; each Innovation Community is driven by a CEO and Innovation Community partners are represented by single legal entities for more streamlined decision-making. Innovation Communities must produce **annual**

business plans, including an ambitious portfolio of activities from education to business creation, with clear targets and deliverables, looking for both market and societal impact.

- The innovation hub model: each Innovation Community consists of five or six world-class innovation hubs, building and leveraging on existing European capacities. An innovation hub brings together diverse teams of individuals from across the Knowledge Triangle together in one physical place (usually within partners' universities or companies), acting as a hub for many Innovation Community activities, and combining competences and skills developed in different areas of specialisation at a pan-European level.
- Innovation Community culture: Europe needs to embrace a true entrepreneurial culture, which is essential for capturing the value of research and innovation, for setting-up new ventures and actual market deployment of innovations in potential high-growth sectors. Innovation Communities are doing just this by integrating education and entrepreneurship with research and innovation and operating according to business logic and a results-oriented approach.

Clusters of Innovations in the water sector

There are some notorious examples of clusters of innovations in the water sector. We will mention here some of these initiatives:

Weateu: Water Efficiency in European Urban Areas

[WE@EU](#) was conceived to coordinate European Research, Development and Innovation (RD&I) in the urban water efficiency sector through high-level trans-national cooperation. In four regions in the WE@EU, a research-driven water cluster already existed, based on solid “triple helix collaborations”⁶, they were Aragón (Spain), Provence-Alpes-Côte d'Azur (France), East of England (UK) and Eastern Galilee (Israel). An additional region with a developing research-driven cluster in Malta joined the consortium.

This European platform enabled the participating clusters and regions to bring together knowledge and innovation potential through trans-national collaboration and mutual learning. This generates an “innovation friendly ecosystem” where academia and business (with particular emphasis on SMEs) worked together, in cooperation and coordination with regional authorities and other stakeholders, transforming knowledge into innovative products, services and skills in urban water management. Over three years these five regions have been working together in order to improve their own capacity in water innovation in urban areas, to create strong links between them in order to generate new business opportunities, to share their experience, and to promote the investment in R&D activities. In addition special focus was given to the improvement of the water innovation infrastructure of Malta (the Malta water cluster). The results of this work can be summarized as follows:

⁶ According to The Triple Helix thesis the potential for innovation and economic development in a Knowledge Society lies in a more prominent role for the university and in the hybridisation of elements from university, industry and government to generate new institutional and social formats for the production, transfer and application of knowledge.

- Number of clusters associates benefiting directly project: 214
- Enterprises benefiting directly or indirectly from the project: 147
- Number of organized B2Bs: 482
- Site visits: 17
- Cluster attendees participating to WE@EU events: 1236
- Cluster growth: 147 new members of the five clusters.

ANNEX IV. BRIGAIID's definition of hazards and European maps of hazard potential

The list of hazards included in BRIGAIID (see Table 1.1 of the DoA) considers: River floods, Coastal floods, Droughts, Heavy precipitation, Storms, Hail, Heatwaves and Wildfires. In the frame of BRIGAIID, these are defined as:

- **River floods:** A river flood is the temporary covering by water of land not normally covered by water, caused by high discharge in a river. High discharge may occur due to extreme precipitation and/or snow melt in areas located upstream, that have sufficient intensity and duration, in combination with soil saturation. Rivers include also mountain torrents and Mediterranean ephemeral water courses (European Union, 2007), however only river sections with catchments bigger than 100 km² are included in this study. Moreover, cases of flooding caused by ice jams are also not included. Urban floods, caused by insufficient sewage system capacity, and flash floods, caused by very short yet intense rainfall over a small area, are considered under "heavy precipitation".
- **Coastal floods:** A coastal flood is the temporary covering by water of land not normally covered by water, caused by high water levels in the sea. High water level may occur due to strong winds blowing sufficiently long over an adequately large area, especially toward the coast, causing a large water run-up at the coast. Unfavourable bathymetric conditions and high astronomical tide further increase the run-up. Coastal floods include floods in estuaries and coastal lakes, caused by influx of seawater into those systems. Changes in storminess, sea level rise and glacial isostatic adjustment are considered, but not local effects such as ground subsidence, coastal erosion and accumulation or changes in tide-surge interactions (Paprotny et al, 2016). It should be also noted that high water levels caused by seiches or geophysical events are not considered here.
- **Heavy precipitation and hail, pluvial floods and storms:** Extreme precipitation induced hazards such as pluvial floods, flash floods, landslides, mudflows, etc. are the result of short-duration rainfall intensities when they exceed a given threshold, e.g. the threshold above which a flood initiates. This threshold corresponds to the criteria used for infrastructure design in different European countries and regions. Infrastructure such as land-based transportation and emergency services are especially vulnerable to extreme precipitation events, as they can lead to the flooding of tunnels and can damage streets, railway lines and bridges. Also electricity and telecommunication networks can be affected by heavy precipitation.
- **Wind storms:** Storms (atmospheric disturbances) are defined by strong sustained winds, which are mostly accompanied by heavy precipitation and lightning and in some case also by hail. European storms range from localized to continental events. Effects of storms tend to affect to urban areas in a higher degree.

- **Droughts:** Droughts are the result of a period of consecutive dry days or days with very low rainfall. According to the World Meteorological Organization (WMO), 'drought means a sustained, extended deficiency in precipitation.' In terms of operational definitions of droughts, these can be classified into four categories: meteorological, hydrological, agricultural and socio-economical (classification of the American Meteorological Society), depending on the types of impacts.
- **Heatwaves:** These phenomena consists in several consecutive days with very warm days. Based on the WMO definition, heatwaves are defined as periods of more than 5 consecutive days with daily maximum temperature exceeding the mean maximum temperature of the May to September season for the control period (1971–2000) by at least 5°C (Jacob et al., 2014). Alexander and Herold (2016) defined heatwaves (HWs) using different approaches, e.g. amplitude, magnitude, number, duration and frequency.
- **Wildfires:** Fires in forested and highly vegetated areas. Global warming affects the sparking of wildfires. In fact, warmer temperatures enable fuels to ignite and burn faster, resulting in faster wildfire expansion. Wind can help the wildfire expansion, while precipitation can decrease the chances of a wildfire igniting.

Hail⁷ has not been considered because of two main reasons: i) none of the BRIGAIID innovations so far is related to hail, and ii) hail is not available as a direct output from climate models and therefore it has not been possible to produce the required hazard potential maps.

The [hazard potential](#) is defined as the probability of occurrence of a climate-related physical event. Therefore, the hazard potential depends on the intensity and probability of the hazard.

In the following pages, the maps of hazard potential for the different hazards considered by BRIGAIID are shown. Further detail on these maps can be found within the deliverable D5.2.

⁷ This clarification is provided because according to the DoA, hail is within the list of hazards to be considered by BRIGAIID.



BRIGAIID

BRIDGING THE GAP FOR INNOVATIONS
IN DISASTER RESILIENCE

Design of Communities of Innovation

D7.8

