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Development of a stakeholder engagement methodology for the creation of a framework for the collection of information on brownfield regeneration

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Abstract

The thesis was developed within the FP7 project “TIMBRE” (Tailored Improvement for Brownfield Regeneration in Europe), which aims at supporting end-users in overcoming existing barriers in brownfield regeneration by developing and providing customised problem- and target-oriented packages of technologies, approaches and management tools for a brownfield’s reuse planning and remediation. Nowadays, a great number of resources (e.g. strategies, guidelines, tools, decision support systems, manuals, and documented case studies) are available. However, they are too often not used in their entire potential and many of them focus only on particular aspects of the regeneration process (Dixon, 2007). This condition of low visibility and fragmentation reduces significantly the availability of resources for end-users and stakeholders. The TIMBRE Expert System aims at overcoming these barriers by supporting users in accessing, consulting, and evaluating the available information in the field of brownfield management according to their specific needs.

In this context, the main objectives of the thesis were the creation and attainment of a shared framework for the collection of available information on brownfield regeneration (TIMBRE framework) and the development and implementation of a methodology for the engagement of stakeholders, aimed at evaluating and improving this framework. These objectives served to the achievement of a shared conceptual structure for the collection and categorisation of available information on brownfield regeneration, made up of all the existing phases that characterise the brownfield regeneration process and serving as a foundation for the TIMBRE Expert System.

The work included a literature review on the brownfield management field in order to develop the first conceptual structure constituting the TIMBRE framework, which is aimed at including all the phases of the brownfield regeneration process. A literature review in the field of stakeholder theory has been performed in order to support the development of a methodology for the engagement of stakeholders. The engagement process was made of two operative phases. In the first operative phase, a series of meetings in the form of workshops and focus group was held. In the second operative phase, a web-based questionnaire was administered to stakeholders. Such engagement methodology allowed collecting feedback, suggestions, comments and opinions from the involved stakeholders on the proposed TIMBRE framework.

As a result, the adopted engagement approach allowed to identify and overcome weaknesses and gaps within the initial structure of the TIMBRE framework, thus permitting to achieve a shared and agreed conceptual structure, which has been successively implemented in the TIMBRE Expert System. Such structure covers all the phases of the brownfield regeneration process and is able to effectively support the organisation of information and their consultation within the Expert System. This work also allowed to test the effectiveness of the adopted engagement methodology providing some useful suggestions for the continuation of the collaboration with the stakeholders. First, it has highlighted that the involvement of different categories of stakeholders allowed a better understanding of their points of view and necessities. Second, its application in different national contexts has brought to light the presence of peculiarities in the role of stakeholders and in the decisional structures of each country. In conclusion, these results can support the further improvement of stakeholder engagement in the next steps of the TIMBRE Expert System development, thus allowing to implement a more effective and tailored tool.

Sommario

La tesi è stata sviluppata all'interno del progetto Europeo TIMBRE (Tailored Improvement for Brownfield Regeneration in Europe), facente parte del Settimo Programma Quadro. Il progetto mira a supportare gli utilizzatori finali nel superare le barriere esistenti all'interno del processo di rigenerazione dei brownfield, sviluppando e fornendo loro tecnologie, approcci e strumenti di gestione mirati e personalizzati per il riutilizzo e la bonifica dei brownfield. Oggigiorno, è disponibile un grande numero di informazioni su questo tema (sotto forma di strategie, linee guida, strumenti, sistemi di supporto alle decisioni, manuali e casi di studio documentati). Tuttavia queste informazioni vengono spesso utilizzate senza sfruttarne a pieno il loro potenziale e, inoltre, molte di queste si focalizzano solo su alcuni aspetti del processo di rigenerazione (Dixon, 2007). Questa condizione di bassa visibilità e frammentazione riduce significativamente la possibilità di consultazione di queste risorse informative da parte degli stakeholder e degli utilizzatori finali. Il Sistema Esperto TIMBRE mira a superare queste barriere supportando gli utenti nell'accesso, consultazione e valutazione delle informazioni disponibili in materia di gestione dei brownfield in base alle loro esigenze specifiche.

In questo contesto, gli obiettivi principali della tesi sono stati la creazione e il conseguimento di un framework condiviso per la raccolta di informazioni disponibili sulla rigenerazione dei brownfield (framework TIMBRE) e lo sviluppo e l'attuazione di una metodologia per il coinvolgimento degli stakeholder, finalizzato a valutare e migliorare il framework stesso. Questi obiettivi sono serviti alla realizzazione di una struttura concettuale condivisa, utile alla raccolta e categorizzazione delle informazioni disponibili sulla rigenerazione dei brownfield, composta da tutte le fasi che caratterizzano il processo di rigenerazione stesso e che funge da base per il Sistema Esperto TIMBRE.

Il lavoro include una revisione della letteratura nel campo della gestione dei brownfield, utile al fine di sviluppare la prima struttura concettuale del framework TIMBRE, la quale mira ad includere tutte le fasi del processo di rigenerazione dei brownfield. È stata condotta anche una revisione della letteratura riguardante la teoria degli stakeholder, al fine di sostenere lo sviluppo di una metodologia per il coinvolgimento degli stakeholder. Questo processo di coinvolgimento è costituito da due fasi operative. Nella prima fase operativa si è tenuta una serie di incontri con gli

stakeholder, nella forma di workshop e focus group. Nella seconda fase operativa si è invece somministrato loro un questionario online.

In termini di risultati, l'approccio di coinvolgimento adottato ha permesso di individuare e superare le carenze e le lacune presenti nella struttura iniziale del framework TIMBRE, permettendo così di ottenere una struttura concettuale condivisa e concordata che è stata successivamente implementata nel Sistema Esperto TIMBRE. Tale struttura comprende tutte le fasi del processo di rigenerazione dei brownfield ed è in grado di supportare efficacemente l'organizzazione delle informazioni e la loro consultazione all'interno del Sistema Esperto. Questo lavoro ha inoltre permesso di verificare l'efficacia della metodologia di coinvolgimento adottata, fornendo alcuni utili suggerimenti per la prosecuzione della collaborazione con gli stakeholder. In primo luogo è stato evidenziato che il coinvolgimento di diverse categorie di stakeholder ha permesso una migliore comprensione dei loro punti di vista e delle loro necessità. In secondo luogo, la sua applicazione in diversi contesti nazionali ha portato alla luce la presenza di peculiarità nel ruolo delle parti interessate e nelle strutture decisionali di ognuno dei paesi coinvolti. Concludendo, questi risultati possono contribuire all'ulteriore miglioramento del coinvolgimento degli stakeholder nelle prossime fasi di sviluppo del Sistema Esperto TIMBRE, consentendo così di dar luce ad uno strumento su misura più efficace.

I. Definition of the problem and objectives of the thesis

Brownfields have been defined by CABERNET¹ as “sites that have been affected by former uses of the site or surrounding land; are derelict or underused; are mainly in fully or partly developed urban areas; require intervention to bring them back to beneficial use; and may have real or perceived contamination problems”.

Their reuse and revitalisation can provide several economic, social and environmental benefits to the surrounding areas and communities but, on the other hand, their redevelopment is rarely simple and it typically presents obstacles of different nature (technical, legal, economic, social, etc.). Moreover, bringing such land back into active use requires the engagement of a large variety of stakeholders (policy makers, developers, local communities, media, etc.), each one of these characterised by different backgrounds, visions, interests and demands. Bartsch (2006) affirms that a successful brownfield regeneration process usually involves a variety of stakeholders, each one of them with specific interests and capabilities that can contribute to project and process achievements. Being able to successfully identify the needed stakeholders and their level of involvement in each phase of the redevelopment process is therefore a critical point that may determine the success or failure of the engagement procedure.

In order to deal with the brownfield regeneration challenge, several networks and projects have been developed. These research projects, based on the sustainable management of contaminated sites and brownfields, have produced in the last years an abundance of strategies, guidelines, tools, decision support systems, manuals, documented case studies, assessment technologies, as well as risk communication methodologies and tools, which, too often, are not used in their entire potential. Moreover, the various conceptual models of brownfield regeneration have focused on particular aspects of redevelopment rather than seeking to examine the process as a whole (Dixon, 2007).

The low visibility and fragmentation of such available resources make their availability and usage very difficult for end-users and stakeholders. For this reason, especially in those countries where the experience on brownfield remediation is still limited, the success of interventions is often unsatisfying in terms of financial, social and environmental acceptance.

¹ CABERNET (Concerted Action on Brownfield and Economic Regeneration Network), is a multidisciplinary network comprising six expert Working Groups that aims to facilitate new practical solutions for urban brownfields (see www.cabernet.org.uk).

The thesis is developed within the European 7th Framework Programme project TIMBRE (Tailored Improvement for Brownfield Regeneration in Europe), whereof the University Ca' Foscari of Venice is partner. The project aims to compensate for the aforementioned problems by providing customised problem and target-oriented approaches, and management tools to end-users involved in the brownfield regeneration process.

In particular, the Work Package 1 of TIMBRE project, led by the University Ca' Foscari of Venice, aims to develop a web-based Expert System for the collection, analysis and classification of already available information on brownfields (e.g., accessible literature, data and further information on previous projects, programs and other activities dealing with the regeneration of brownfields). This tool will allow experts, stakeholders and decision-makers involved in the regeneration process to access, consult and evaluate the information they need. The work's thesis places itself at the beginning of the Expert System's creation process, as represented in Figure I.1.

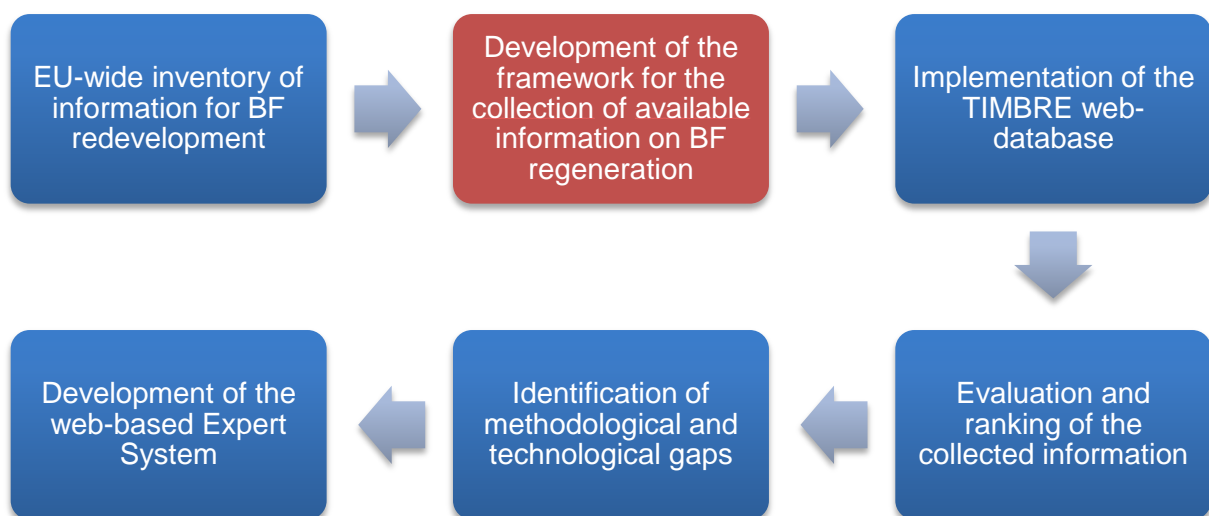


Fig. I.1 - Schematic representation of the development process of the TIMBRE Expert System.

The thesis deals with the initial phase of this process, during which the framework for the collection of available information on brownfield regeneration (TIMBRE framework) has been developed. The objectives of the work thesis come from the necessity to identify a shared

conceptual structure for the collection and categorisation of available information on brownfield regeneration. Such structure, represented by the TIMBRE framework, is made up of all the existing phases that characterise the brownfield regeneration process and it serves as a foundation for the Expert System. Moreover, in order to avoid the development of a complex tool, it is important that the actors for which it is designed can evaluate and potentially further improve it, in order to finally obtain a useful and manageable product. According to such motivations, the specific objectives of the thesis are:

- a description of the state of the art of brownfield regeneration principles, especially focusing on the European situation;
- a description of the most used stakeholder engagement methodologies, with particular reference to the field of brownfield management;
- the development of a framework for the collection of available information on brownfield regeneration (TIMBRE framework), which will serve as a structure for the categorisation of the information within the web-based Expert System;
- the creation of a methodology for the engagement of selected stakeholders for the evaluation and further improvement of the framework in order to obtain a useful and shared scientific result.

II. Outline of the thesis

The thesis is structured in three main sections:

- **PART A: LITERATURE REVIEW**

- Chapter 1 initially describes the project TIMBRE in its entirety. Then, it focuses on the Work Package 1, within which the work described in this thesis was done.
- Chapter 2 provides a literature review on the state of the art of brownfield regeneration. The chapter discusses the different definitions of brownfields, concerns and potential opportunities generated by them, regeneration principles and potential obstacles, and, finally, provides a description of the scale and nature of brownfields in the European Union.
- Chapter 3 presents a literature review on the engagement of stakeholders. Firstly, important definitions related to stakeholders' management are provided. Secondly, principles of the stakeholder engagement process and some methods are described. Finally, the stakeholder panorama in the field of brownfield regeneration is described.

- **PART B: METHODOLOGICAL DEVELOPMENT**

- Chapter 4 describes the development process of the TIMBRE framework for the collection of available information on brownfield regeneration. It describes the 5 steps that characterises the development process and shows the evolution of the framework before its evaluation by the side of stakeholders.
- Chapter 5 thoroughly describes the engagement process that has been adopted in order to create a collaboration with stakeholders in the field of brownfield regeneration for the further improvement of the TIMBRE framework.

- **PART C: CASE STUDY APPLICATION**

- Chapter 6 presents and discusses the results of the engagement process.
- Chapter 7 illustrates the conclusions on the basis of the obtained results originating from the engagement process.

PART A – LITERATURE REVIEW

1. The TIMBRE project

The European research project TIMBRE is a project funded by the European Commission's Seventh Framework Programme for Research and Technological Development (FP7). It consists of a consortium of 15 partners provided with expertise in the brownfield regeneration context and is supported by an International Advisory Board. TIMBRE "aims to support end-users in overcoming existing barriers by developing and providing customised problem- and target-oriented packages of technologies, approaches and management tools for [brownfields'] reuse planning and remediation" (TIMBRE, 2011).

One of TIMBRE's main objectives is to screen what has been done so far in the brownfield regeneration context within the European Union. It focuses on existing and already implemented tools and strategies which have already proved to be successful and have been socially accepted over time. The objective is to identify transferable best practices which will be collected in an Expert System developed by TIMBRE Work Package 1 (see paragraph 1.2.1). Moreover, the project also aims to fill identified "existing knowledge gaps by developing innovative technological remedies together with tailored decision support tools" (Bartke, et al., 2012).

TIMBRE adopts a holistic approach in dealing with a set of problems related to the brownfield regeneration process. It is aimed at providing technologies and management strategies that deal with social, economic and environmental aspects of the regeneration process and it will consider those spatial, social and political conditions that might affect the process itself (Bartke, et al., 2012). TIMBRE bases its work on the assumption that only by considering all the mentioned elements the success in brownfield regeneration can be potentially reached (TIMBRE, 2011). Finally, another goal of the TIMBRE project needs to be mentioned within this work thesis: TIMBRE aims to assess stakeholders' needs through the development and release of approaches, technologies and tools.

1.1. Case studies

The TIMBRE project focuses on specific case studies, which are represented by single brownfield sites and registers of them. Six different sites and two registers have been selected in order to test TIMBRE approaches and technologies (*ibid.*). Focusing on more case studies gives to TIMBRE project the possibility to investigate and test the proposed approaches on a wider spectrum of

realities. In Table 1.1 the list of case studies involved in the project TIMBRE is provided. The sites and registers are located in Central and Eastern European countries marked by a long history of industrial development which has left behind a series of derelict sites and brownfields with the economic structural change that took place in the 1990s.

Table 1.1 - TIMBRE application areas (adapted from TIMBRE, 2011).

Type	Location	Former usage	Involved/Important stakeholders
Site	Romania, Hunedoara County, Hunedoara City	Coke production, ironworks, steelworks, recycling materials	Hunedoara City Hall, Local council of Hunedoara
Site	Poland, City of Szprotawa	Airbase	Public administration, public/private owners, NGOs
Site	Poland, City of Żagań	Industrial site	Site owner, public administration, potential redevelopers, general public
Site	Czech Republic, Moravian-Silesian Region, City of Ostrava	Refinery of oil until 1980, then factory for regeneration of used oils	City of Ostrava, Ministry of Industry of the Czech Republic, Moravian-Silesian Region Administration
Site	Czech Republic, South Moravian Region, City of Brno	Machinery plant and metal foundry	City of Brno, South Moravian Region Administration
Site	Germany, Krampnitz, City of Potsdam	Military base	Brandenburgische Boden Gesellschaft (site owner), Federal State of Brandenburg, Local Council of Potsdam
Register	Germany, East Germany	Commercial and industrial	-
Register	Germany, State of Brandenburg	Former military sites of the Soviet Army	-

Stakeholder involved in the case studies mentioned in Table 1.1 have been involved in order to get a broader acceptance of the project outcomes of the different TIMBRE work packages. In fact, these sites are used as case studies in order to test the applicability of different brownfield regeneration approaches, technologies and tools. It is good to specify that not only the mentioned stakeholders participated in the TIMBRE Work Packages activities, but, in some occasions, also stakeholders external to the project were involved and consulted on specific topics.

1.2. Work Package 1

The main objective of the Work Package 1 (WP1) is the development of an Expert System for the collection, analysis and classification of accessible literature, data and further information on

previous project, programs and other activities focusing on the regeneration of brownfields. Such information encompasses all types of possibly helpful instruments such as methods, tools, strategies, best practices as well as technologies for brownfield regeneration. The Expert System will allow easy access and an intuitive interface to collected information for all partners and end-users. In order to obtain this final result, WP1 aims to:

- develop a EU-wide inventory of useful and practicable solutions, technologies and instruments related to brownfield regeneration;
- develop a framework with the purpose of defining the conceptual structure which serves as a foundation for the TIMBRE Expert System;
- design of the TIMBRE web database for the collection of the provided information;
- evaluate and rank the collected approaches, methods and tools for brownfield regeneration;
- develop the Expert System for end-user friendly provision of meta data and customisable information and tools for brownfield regeneration.

For its purposes, WP1 applied its outcomes to three of the case studies mentioned in Table 1.1: Hunedoara (Romania), Szprotawa (Poland) and Ostrava (Czech Republic). Moreover, “external” stakeholders not involved in TIMBRE case studies have been engaged in the work of WP1. Such stakeholders have been selected from five countries participating to the project, namely Czech Republic, Germany, Italy, Poland and Romania.

1.2.1 The TIMBRE Expert System

As mentioned above, the main objective of Work Package 1 is the development of an Expert System that is able to collect and provide available information (e.g., guidelines, reports, tools, best practices) useful for the management and regeneration of brownfields. The Expert System aims to let different types of stakeholders and end-users to be able to access available information and tools for brownfield regeneration and to select the most suitable solutions for their specific activities and needs within the brownfield regeneration process. This tool will allow experts, stakeholders and decision-makers involved in the regeneration process to search, consult and evaluate the information they need.

1.2.2 The TIMBRE framework

One of the objectives of the WP1 is the development of the TIMBRE framework for the collection of available information on brownfield regeneration. Its purposes are strictly connected with TIMBRE objectives and, more specifically, with those of Work Package 1. The framework will be implemented in the TIMBRE Expert System and will guide the collection and the consultation of available materials on brownfield regeneration. In fact, the TIMBRE framework represents the conceptual structure which will serve as a foundation for the Expert System. Such structure is made up of all the existing phases that characterise the brownfield regeneration process and it serves as a foundation for the Expert System. The TIMBRE framework is thoroughly described in Chapter 4.

2. Brownfield regeneration

2.1. Brownfield definition and meaning

A globally recognised definition of the term “brownfield” does not exist. There are, however, a number of alternative definitions at the international, pan-European, national and regional level (NICOLE, 2011). The fact that it is not possible to define exactly when a site can be classified as a brownfield represents one of the barriers to their regeneration.

The term brownfield came firstly into use in the United States of America during the 1970s between actors involved in the economic development processes (Jones & Welsh, 2010). It originally referred to “any previously developed property, irrespective of contamination issues” (Jones & Welsh, 2010; Yount, 2003). The definition evolved through the years and in the 1990s it started to assume a more defined shape. Practitioners and researchers noticed that new regulatory frameworks for the protection of the environment were actually working against the remediation and regeneration of abandoned industrial and commercial sites, fostering the development on unutilised land (Hollander, et al., 2010). Scholars such as Charles Bartsch, Senior Policy Analyst for Economic Development at the Northeast-Midwest Institute in Washington D.C., often referred as “the father of brownfields”, started to utilise the term “brownfield” to express both the challenges and opportunities vacant lots or abandoned properties can offer. This led to the current definition of brownfield within the US territory, which is expressed by the United States Environmental Protection Agency (EPA), with certain legal exclusions and additions, as a

“real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of hazardous substance, pollutant, or contaminant.”²

The definition focuses on the real or perceived contamination of a site that, as Bartsch et al. (2004) assert, “can cause fear in those who may otherwise be willing to put these sites back into use – fear of costs, complications, delay, or even legal liability associated with the pollution”. Moreover, such definition pays particular attention to the problem of protecting the value of the land and the ability to fulfil market transactions on it, but it does not yet look complete.

² Small Business Liability Relief and Brownfields Revitalization Act, Pub. L. No. 107-108, 115 Stat. 2356 (2002). (<http://www.gpo.gov/fdsys/pkg/PLAW-107publ118/html/PLAW-107publ118.htm>) [retrieved on 09/07/2012]

In fact, this definition does not highlight some important elements that characterise brownfields such as the past (and current) use of the areas, their location and their geographical, economic, and social context (APAT - Agenzia per la protezione dell'ambiente e per i servizi tecnici, 2006).

Brownfield sites are not only present in the United States, but in almost every industrialised and newly industrialised country such as Member States of the European Union. Bartsch & Collaton (1997), talking about the US situation, affirm that “virtually every city in the nation’s older industrial regions [...] grapples with the challenge of unused or abandoned [...] industrial sites”. Referring to Europe, it is not possible to estimate the number of brownfields in the European Union because the lack of available data for a large portion of European countries impedes such measurements (Oliver, et al., 2005).

In the last two decades the meaning of the term “brownfield” has crossed the US borders and has assumed different meanings, which are shaped by the diverse perceptions that countries have about brownfield land. To emphasise the non-homogeneity of definitions of the term “brownfield” between different countries, Nathanail et al. (2003) indicate that several different definitions of it exists and, at the same time, many languages either do not have a term or simply adopt the English word. A survey amongst the members of the CABERNET network³, initiated in order to establish the most used definitions of the term “brownfield” throughout the EU and the accession states (Oliver, et al., 2005), confirms Nathanail and colleagues assumptions.

In Table 2.1, the definitions of “brownfield land” based on the responses of members of the CLARINET⁴ and CABERNET networks are described. The NICOLE Brownfield Working Group (2011) has grouped the definitions resulting from the questionnaire into the following categories:

- **contaminated sites:** brownfields and sites with real or perceived contamination are considered synonyms. The USEPA definition fits into this category: “real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant”;

³ The CABERNET network consists of 55 Members, including 8 Team Leaders and 4 Coordination Team members, originating from 21 countries across Europe. The groups cover the different aspects of rehabilitation of brownfield sites. (<http://www.cabernet.org.uk>) [retrieved on 09/07/2012]

⁴ CLARINET (Contaminated Land Rehabilitation Network for Environmental Technologies): project funded under the Environment and Climate Programme of the European Commission.

- **derelict sites:** brownfields are considered derelict or unused land which might or might not be affected by contamination;
- **previously used sites:** brownfields gain the general definition of land that “has previously been in a built development use”. Such definition includes different typologies of land such as inner built urban areas, domestic gardens and green spaces, school playing fields, and other types of sites that are neither derelict nor contaminated;
- **site requiring interventions:** definitions in this group assign to brownfields the meaning of “land requiring intervention”. Such typology of land possesses some features (e.g. dereliction, contamination, etc.) that lower its economic value, and thereby hinder the regeneration process. CLARINET and CABERNET definitions fit in this category.

Table 2.1 - Definitions of ‘brownfield’ land in European nations based on the responses of members of the CLARINET and CABERNET networks. Adapted from Oliver et al. (2005). (*Author update)

Country	‘Brownfield’ definition	Data Source
Austria	Brownfield (Brachfläche): previously used site or part of a site, which is presently derelict or underused. Owing to the site characteristics (e.g. dedication, status of its opening up for development, location) it offers a potential for reuse. The period, for which the site has been derelict, is not relevant*	Austrian Standards Institute (standard ON S2093)
Belgium	Wallonia: Sites previously dedicated to economic activities and where the current condition is contrary to ‘efficient land use’ (Sites d’activité économique désaffectés – SAED).	Direction Generale des Ressources Naturelles et de l’Environnement (DGRNE)
	Flanders: Abandoned or under used industrial sites with an active potential for redevelopment or expansion but where redevelopment or expansion is complicated by a real or perceived environmental contamination (legislation including a definition is in the process of approval).	Openbare Afvalstoffenmaatschappij voor het Vlaamse Gewest (OVAM)
Bulgaria	Contaminated sites – areas where previous activities have ceased but are still impacting on neighbouring areas.	University of Mining and Geology, Sofia
Czech Republic	Sites that have been affected by the former uses of the site and surrounding land; are derelict and underused; may have real or perceived contamination problems; are mainly in developed urban areas; and require intervention to bring them back to beneficial use (CABERNET definition).	Czech Brownfield Regeneration Strategy, Progress Report (Czechinvest)
Denmark	Land affected by contamination.	Danish Environmental Protection Agency
Finland	No recognised definition.	Finnish Environment Institute
France	Space previously developed that are temporarily or definitely abandoned, following the cessation of activity and need to be reclaimed for future use. Can be partially occupied, derelict or contaminated.	Ministère de l’Environnement

Germany	Inner city buildings not under use. Inner city areas for redevelopment and refurbishment.	Umweltbundesamt Berlin
Greece	No information.	
Hungary	No information.	
Ireland	Derelict land: Land which detracts, or is likely to detract, to a material degree from the amenity, character or appearance of land in the neighbourhood of the land in question because of ruinous structures, neglected condition or presence of waste.	Environmental Protection Agency
Italy	Contaminated site: site that shows levels of contamination or chemical, physical or biological alteration of soils, sub soils and of superficial or underground water in a way to determine danger for public health or for the natural or built environment. The site must be considered contaminated if the presence of only one of the values of contaminant in soils, sub soils, superficial or underground water is higher than the permitted values of the law.	Italian National Law 426/98 and Italian National Law 471/99
Latvia	A place that has been previously used or built up, but currently is derelict or abandoned - can also be contaminated (adapted CABERNET definition).	Riga City Council
Netherlands	Areas in towns and cities where in the past industrial activity has taken place, but which have since fallen into disuse.*	Ministry of Housing
Poland	Degraded areas due to diffuse soil contamination - high density of landfill sites.	Ministry of Environment
Portugal	No information.	
Romania	Polluted lands (soils).	Ministry of Waters and Environment
Slovak Republic	No information.	
Slovenia	Degraded / abandoned building land usually inside urban areas.	University of Ljubljana [sic]
Spain	Basque Country only: Potentially contaminated sites / Industrial ruins.	IHOBE (Environmental Performance Agency of the Basque Government)
Sweden	No official definition – commonly understood as formerly used land which needs revitalisation (or remediation before going back to the nature).	C. Egelstig (JMAB)
United Kingdom	England and Wales: Previously developed land – land which is or was occupied by a permanent structure (excluding agricultural or forestry buildings), and associated fixed surface infrastructure.	Planning Policy Guidance Note No 3: (PPG3) Housing DETR (2000); Welsh Assembly
	Scotland: Vacant and derelict land.	Scottish Executive

What can be observed is that, as Oliver et al. (2005) affirm, “Europe is still some way from a commonly accepted brownfield definition”. On the other hand, it has been noticed (NICOLE,

2011) that there is a tendency to converge towards the CABERNET definition⁵, which defines brownfield land as

“sites that have been affected by former uses of the site or surrounding land; are derelict or underused; are mainly in fully or partly developed urban areas; require intervention to bring them back to beneficial use; and may have real or perceived contamination problems.”

The national definitions are not in contradiction with the CABERNET explanation (Siebielec, et al., 2012). In fact, it embodies the characteristics of dereliction, contamination and intervention, which have been identified in the definitions provided through the aforementioned CABERNET Survey.

Ferber et al. (2006) give a straightforward explanation of the CABERNET definition asserting that brownfield land is primarily a derelict, under-utilised or vacant land on which previous use has ceased or subsided and, as a result, the market was not able to effectively reuse without some sort of an intervention. This situation can be even more stressed by the presence of real or perceived environmental damage. However, the Italian Agency for Environmental Protection and Technical services (APAT, Agenzia per la Protezione dell’Ambiente e per i servizi Tecnici) (2006) highlights the fact that this definition does not adequately consider the social and economic effect of the regeneration interventions of the brownfields. Considering the problem only from the point of view of environmental restoration depicts brownfields only as an obstacle for the government of the territory and not as an opportunity.

By looking at the CABERNET definition, it is also important to notice that a site does not have to be entirely vacant or derelict to be categorised as a brownfield. Some of them in fact, may still be partially in use. Although many brownfields are no longer in full use, the adjective “underutilised” implies that sites in this category are unlikely to be wholly in use (Ferber, et al., 2006).

⁵ The CABERNET definition has been refined from an original definition proposed by CLARINET ‘Brownfields in Europe’ Working Group 1 that identifies brownfields as “sites that have been affected by the former uses of the site and surrounding land; are derelict or underused; have real or perceived contamination problems; are mainly in developed urban areas; require intervention to bring them back to beneficial use.”

2.2. Concerns and potential opportunities connected to the presence of brownfields

Brownfields can be seen both as a set of problems and as an opportunity. It is important to be aware of these two aspects. Ferber and colleagues (2006) affirm that not being able to recognise the presence of a problem is a problem itself. Differently, if identified, remediated and redeveloped, brownfields can play a critical role in the positive transformation of the communities affected by their presence (Hersh, et al., 2010).

2.2.1 Concerns raised by the presence of brownfields

Brownfields can raise significant negative environmental, economic and social concerns on the surrounding areas and communities if left in their deteriorated state. Such problems may be related to the economic factors that caused the decline or cessation of the former use of the land, to social problems that have resulted from this economic decline, to the environmental impacts or to a combination of them (Bardos, 2003). It is important to consider the fact that such concerns may vary depending on the characteristics of the brownfield site under exam (size of the property, location, size of the affected community, presence of contamination, etc.). Here below the most common preoccupations caused by the presence of a brownfield are reported.

Environmental and human health related problems

Brownfields potential contamination can pollute soil, air, water bodies and groundwater resources. Harmful substances may be present as the result of past industrial and commercial activities (Hersh, et al., 2010) or wastes dumped illegally on a neighbouring site (Hersh, et al., 2010; Siebielec, et al., 2012), however it must be clarified that not all brownfield sites are contaminated (Siebielec, et al., 2012). Exposure to soil, air and water pollution resulting from contaminated sites can have negative effects on the human health (Hersh, et al., 2010).

Urban blight and urban sprawl

The abandonment or interruption of the maintenance of brownfield sites by their owners can foster the further deterioration of such properties. Hersh and colleagues (2010) affirm that the impression left by abandoned sites with derelict buildings and covered by trash can show evidence of urban decay even in an otherwise well-kept neighbourhood.

Furthermore, contamination and clean-up costs can make brownfields less attractive to build on than greenfields. Such situation can contribute to the phenomenon of urban sprawl. In other words, this means that maintaining brownfields in their deteriorated state can represent an additional cause of further development on greenfield land. Such situation not only leads to an over-exploitation of undeveloped land, but can also stimulate the development of other brownfield areas. In fact, the presence of brownfields can generate a lack of investment activities and a further loss of attractiveness, creating a spiral effect that can progressively deteriorate the surrounding areas (Ferber, et al., 2006).

Social related problems

Abandoned buildings and neglected sites can promote the generation of social problems within the surrounding community. These areas often receive unwanted attention from problematic inhabitants such illegal drug dealers, arsonists or illegal trash dumpers (Hersh, et al., 2010; Siebielec, et al., 2012). Such sites can also be, as Hersh et al. (2010) affirm, “attractive nuisances”. Children, while exploring such sites, might have to deal with broken glass, rusting metals, leftover toxic materials and dangerous structures.

Social issues can also originate from the costs of remediation and regeneration of the brownfield site. In fact, a high cost of such operations causes the rise of the selling price of the site. This implies a change in the population structure more oriented to upper classes that can afford higher prices (Siebielec, et al., 2012). Such phenomenon is referred to as “gentrification”. The idea of gentrification is encapsulated as the transformation of an urban neighbourhood through the gradual arrival of middle-class or well-to-do residents who eventually replace poorer or working-class residents (Guimond & Simard, 2010).

Community Morale

Hersh and colleagues (2010) state that the presence of a brownfield might diminish the community spirit. The aesthetic, environmental, public health and safety, and economic effects of brownfield sites can deeply influence the community morale. In fact, it may result difficult to feel the sense of belonging to a community that lives surrounded by derelict, abandoned and contaminated properties.

Economic related problems

Brownfields can negatively influence the local economy. Nuisances, hazards and criminal activity on vacant properties require to be managed and limited by local police, fire, building and health bodies, which all require a considerable cost. Moreover, brownfields do not generate tax revenue, and derelict buildings and lots can negatively affect the value of nearby properties (Hersh, et al., 2010). Also, when a site is perceived as contaminated it loses its values. In other words, the uncertainty of the presence and the extent of a contamination acts as a disincentive for investments in the regeneration of that brownfield site (*ibid.*).

Finally, municipalities often lack the economic capability needed to face the costs brought by the presence of brownfields. Therefore, if they are in charge of the regeneration process, they often have to rely on external sponsors, regional or national supports, etc. (Hersh, et al., 2010).

2.2.2 Potential opportunities presented by the presence of brownfields

The regeneration and reuse of brownfields, if properly done, can provide several environmental, economic and community benefits (Bartsch, et al., 2004). The effects of such benefits can then be extended from the immediate area of the site to the nearby communities (Hersh, et al., 2010). Groenendijk (2006) makes a distinction between two typologies of benefits:

- economic and social benefits for the whole society (in this category also environmental benefits are included);
- financial benefits for specific economic actors (commercial benefits for private parties and fiscal benefits for public bodies such as national or local governments).

With such classification, Groenendijk (2006) adopts an anthropocentric vision, useful to identify the possible advantages that a community of people may obtain from brownfield regeneration. Besides, it is also possible to make a distinction between economic, environmental and social benefits within these two typologies. Other authors identify potential opportunities provided by the regeneration of brownfields. Here, a classification based on Groenendijk (2006), Bartsch et al. (2004) and Hersh et al. (2010) is proposed.

Economic, environmental and social benefits for society

There are several potential economic, environmental and social advantages resulting from brownfield regeneration that can benefit a community of people:

- *protection of public health and the environment:* regenerating a brownfield site can improve the quality of the different environmental compartments (e.g., groundwater and soil) and remove a threat to public health;
- *reduction of development pressure on greenfield sites and of urban sprawl:* nowadays a large number of cities are suffering from growing problems generated by urban sprawl, derelict and deprived areas, and transport congestion (CABERNET, 2006). Brownfield regeneration can provide a number of benefits able to reduce urban sprawl. Being able to use infill development in brownfield space within the city's boundaries and to decrease the number of people that want migrate from inner-urban to suburban areas can help to decrease urban expansion, thus reducing the pressure on natural landscapes and greenfield land. Moreover, there can also be a reduction in externalities from transportation (air pollution, congestion, etc.) due to reduction in commuter travel (Smith, 2008);
- *infrastructure advantages:* brownfields are places that have already been developed. Therefore, they often possess infrastructure such as transport routes, water and electricity that can be more economically efficient to upgrade when compared to build new infrastructure into greenfield areas. As a result, the costs of investment might be reduced (Siebielec, et al., 2012);
- *maintenance of existing jobs and creation of new ones:* brownfield regeneration can provide new jobs and training. Groenendijk (2006) states that jobs can be created through different inputs. First, the safeguarding and creation of jobs generated by the regeneration process itself. Second the creation of jobs generated the establishment of new companies on the regenerated brownfield site, and by multiplier effects of these new settlements. Finally, the safeguarding and creation of jobs by increasing the attractiveness of the involved urban area;
- *increase of property values and community services:* a successful regeneration of a brownfield can increase the land value of a property. As a result, more money for the community services and infrastructures are available (school, parks, public transport, etc.) (Hersh, et al., 2010);
- *community transformation:* the elimination of socio-economic stigmas associated with living in the proximity of brownfield sites can bring new hope, investment and vitality to affected neighbourhoods. Moreover, regenerated brownfields can go beyond and change

their previous uses. For example, former industrial sites can be regenerated and transformed in new living quarters, business incubators or green areas such as parks or community gardens (Hersh, et al., 2010).

Commercial benefits and Public fiscal benefits

Groenendijk (2006) states that private stakeholders' main motivation in joining a brownfield regeneration activity is the profit that can be made from it. In other words, their first goal is to regenerate and redevelop the site into something exploitable and marketable. The main commercial benefits are:

- profit resulting from infrastructure and objects (housing, offices, recreational facilities, etc.) on the regenerated site;
- profit resulting from the sale of the regenerated site.

Also the public sector can obtain such benefits if it is involved in the property selling and/or economic exploitation of the regenerated brownfield (*ibid.*). Brownfields clean-up and regeneration can serve as a catalyst for economic development since it increases the number of jobs and expands the tax base of local governments. Public fiscal benefits can be obtained by (Groenendijk, 2006):

- restoration and/or improvement of the tax base of vacant and underutilised sites;
- dispersion of fixed costs through the utilisation of existing infrastructure and services;
- revenue from development charges.

The significance of brownfield regeneration for sustainable development

All the aforementioned potential problems and opportunities can have a great influence on the development of a region. Moreover, they can be classified in the three dimensions of sustainable development: social, economic and environmental. Although "sustainability remains a 'contested' concept and [...] lacks the mechanism or metrics to be fully operationalised" (Dixon & Doak, 2006), it is undeniable that the regeneration of brownfield is strongly linked to the principles of sustainable development (CABERNET, 2006; Ferber, et al., 2006; Pediaditi, et al., 2010; Vanheusden, 2007; World Bank, 2010). However, it is important to clarify the fact that "any argument that all brownfields redevelopment is inherently sustainable is unjustified" (Eisen, 1999). CABERNET (2006) characterises brownfield opportunities and redevelopment responsibilities in relation to sustainable development objectives as follows:

- economic benefits such as the mobilisation of human resources, and the improvement of the urban fabric through the reuse, if possible, of the existing infrastructure and buildings. Also, the economic growth of the surrounding areas can increase public and private income;
- environmental benefits comprise the clean-up and remediation of previously used land when necessary, and the reduction of the exploitation of greenfield land and of the urban sprawl by privileging the use of brownfields.
- social benefits help to improve the quality of life in the affected areas. Also, the inclusion of a socio-cultural dimension ensures the long-term sustainability of brownfields regeneration. Finally, the engagement of communities in the regeneration process can provide better results avoiding a potential decline and recreation of the past situation.

Because of the emergence generated by the necessity to regenerate brownfields in a sustainable way, RESCUE (2003) provided an EU-wide definition of “sustainable brownfield regeneration”, which, as affirmed by Dixon & Doak (2006), sets brownfield within a “triple bottom line” framework:

“The management, rehabilitation and return to beneficial use of brownfields in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations in environmentally sensitive, economically viable, institutionally robust and socially acceptable ways within the particular regional context.”

Reducing negative impacts by revitalising brownfield areas can raise opportunities at different levels by improving the quality of life and enhancing urban competitiveness. Specifically, brownfield redevelopment is a land use strategy that emphasises long-term sustainability goals rather than unrestrained economic growth and resource expansion (Dorsey, 2003). Effective, economic and sustainable land use also directly supports national competitiveness. Sustainable land use, sustainable urban agendas, sustainable urban policies, sustainable environmental, economic and cultural development all touch on and address the issues of brownfield land reuse (Ferber, et al., 2006).

2.3. Brownfield regeneration principles and potential obstacles

Brownfield regeneration can be both considered as an opportunity and as a significant challenge. Several key principles of the brownfield regeneration process are strictly connected to the presence of a large variety of stakeholders involved in the process itself (CABERNET, 2006; Ferber, et al., 2006). The different stakeholders may undertake a brownfield redevelopment project by working either individually or through a variety of partnership arrangements and such approaches may lead to very different decisions (English Partnerships, 2006). It is in fact of major importance to consider and integrate in a shared way the different interests, capacities and abilities of the stakeholders involved in the regeneration process. The main difficulty arises from the fact that, to successfully regenerate a brownfield, it is fundamental to operate in the context of the area in which it is located. There is no opportunity to solve the problems generated by a brownfield by isolated actions and activities. As affirmed by Ferber and colleagues (2006), “only a strategic goal-oriented approach, as an integrated part of local land-use management framed by a systematic development planning, can guarantee an efficient redevelopment of the site.”

The wide variability of brownfield typologies, characterised by numerous and various potential issues, makes it difficult to develop a standard process for their regeneration. The different problems and their possible combinations present the necessity to adopt every time a tailored methodology able to solve them. Moreover, the political, institutional and especially financial situation of a country can strongly influence and limit the choice of the most suitable approach (Ferber, et al., 2006). Finally, “the non-visibility of the many strategies, approaches, methodologies and technologies is one of the reasons why owners, managers, local authorities and other stakeholders often do not regenerate brownfield using the most fitting technologies and decision support systems measures” (TIMBRE, 2011).

As said above, the development and adoption of a specific method to carry on a brownfield regeneration process depends on a series of political, institutional, financial and other conditions (Ferber, et al., 2006). There have been several attempts to define approaches and methods describing the brownfield regeneration process but no one of them can represent a universal solution suitable for any specific case. Here it is represented a summarised version of the “Collaborative Strategic Goal-Oriented Re-Development Approach” (CoSGOP) (*ibid.*) developed on the background of the Central European brownfield redevelopment panorama. Such approach is divided into five “main steps”, which can be seen as sequential time intervals of the

brownfield regeneration process: benchmarking and preparatory step, visioning step, pre-planning and planning step, implementing step, and monitoring step. This process has been described in order to provide be a “temporal” representation of the brownfield regeneration, without analysing in depth all the specific steps that can be included in these five phases.

Benchmarking and Preparatory step

Ferber, et al. (2006) state that brownfield regeneration project obtain fail in their initil phases “because of the absence of clear strategies based on joint stakeholders’ development visions and goals, insufficient co-ordination within stakeholder group, absence of mutual trust and often insufficient co-ordination within the local government itself [...].”

Therefore, in order to build a solid foundation, it is important to start the regeneration project by identifying and evaluating the local capabilities of the involved actors and by having a clear picture of where a project is and where it is headed. It can be difficult but at the same time fundamental to know from the beginning of the project who to include and involve in plans, conversations and meetings. In this phase, it is recommended to define the general plan of the project, its goals and the responsibilities of the single actors within it.

It is also fundamental to analyse the site under exam. It is requested a broad investigation and assessment activities focused on the identification of the problems and potentials of the area itself, remembering to take into account the external conditions that have a fundamental role in the direction a regeneration process should take. Usually, the utilised criteria for the site analysis consists of four main groups: economic criteria, ecological criteria, social criteria and urban fabric criteria (Ferber, et al., 2006). Moreover, data can be collected at different levels (World Bank, 2010):

- site specific data can track previous site uses and likely contamination processes, current ownership status, legal status, size and location of the site, potential extent of pollution;
- data on immediate surroundings can identify land-uses and zoning for adjacent sites and possible restrictions on a future development. Depending on the characteristics of adjacent sites, there will be limitations on what a potential redevelopment will look like;
- neighbourhood data can offer clues on the character of the area (e.g. predominantly industrial or residential, poor or wealthy, ethnically divided or homogeneous, etc.), on

existent links to local infrastructure and on neighbourhood dynamics (new developments or generally derelict and underused);

- local level data provides citywide dynamics and trends. The size of the city and its dynamics (growing or shrinking), the size of its market and economic trends, the link to national and international infrastructure (roads, highways, rail, airports).

Visioning step

Considering the brownfield opportunities and problems individuated at the initial stage, it is opportune to develop different potential scenarios and strategic concepts for the regeneration process. Determining the future use on former brownfield sites is one of the key elements for the success of a project. The visioning mostly relies on the use of qualitative, subjective techniques.

Pre-planning and Planning step

The pre-planning phase confronts the alternatives and scenarios developed in the previous phase in a more detailed way. Unlike the visioning phase, here are used quantitative, scientific techniques such as scientific modelling. Here it is evaluated the real possibility of achieving the defined goals by implementing a certain development strategy and therefore it is possible to reach a more accurate final decision. It is important to take into account the objectives of the involved stakeholders and to define an agreed list of priorities through a fair mediation. During the pre-planning it can be also evaluated an initial risk assessment and initial remediation cost evaluation. This may be accomplished by overlaying the identified contamination pattern with potential redevelopment scenarios and then identifying and prioritising/ranking solutions in terms of their remediation requirements (World Bank, 2010).

In the planning phase, the redevelopment plan is precisely defined: environmental impact assessment and mitigation plans are developed; public-private partnership are negotiated; the sharing of risks and benefits among participating actors is decided; and incentives schemes and sources of co-funding are identified (World Bank, 2010). In other words, the chosen redevelopment scenario starts to be operationalised through a system of inter-related activities and measures coordinated in time and space.

Implementing step

It represents the realisation of the selected measures and programmed activities in accordance with the developed plans and programmes. In particular, the action plan developed in the previous steps is put into operation, the proposed measures and programmed activities are realised, and the activities and measures between stakeholders are co-ordinated. During this step, it is also important to begin a monitoring process. It means paying particular attention to the supervision as redevelopment of the brownfield site takes place.

Monitoring step

Ferber and colleagues (2006) assert that “[t]he program implementation monitoring represents the investigation and assessment of the implementation process, feedback including strategic impact assessments and ex-ante evaluations, whereby retrospective methods will determine whether the rehabilitation scheme has been successful or not.”

There should also be a long-term monitoring process useful to assess the integration of the regeneration process with the surrounding environment. If needed, an adjustment phase may follow in order to implement activities and strategies that aim to correct the possible problems that may have occurred.

As said above, the described process is a theoretical representation of the temporal phases that characterise the brownfield regeneration process. The TIMBRE framework, explained in chapter 4, provides a detailed description of all the procedural phases that characterise the brownfield regeneration process. The phases are represented by the categories of information that compose the TIMBRE framework itself (see Chapter 4.3). It differs from the CoSGOP approach because of different objectives. The TIMBRE framework does not aim at providing a decisional process but it wants to dispense a conceptual structure for the categorisation of available information on brownfield regeneration.

2.4. Scale and Nature of European brownfields

The process of industrial change that began to affect Europe after the mid-1900s generated a wide number of brownfields across Europe. The first brownfields appeared in Europe around the 1970s, when large industrial sites that sprawled in the past decades started to close (CABERNET, 2006). At the beginning of 1980s, governments started to face the problem in order to promote a structural change in the affected industrial regions of Europe. Scale and quality of brownfield in the European Union changed in the 1990s because of the process of integration of eastern European countries, which became completely effective between 2004⁶ and 2007⁷. Such integration brought an enormous change in the scale and quality of brownfields within Europe and highlighted regional discrepancies between western and eastern European Countries. In fact, western European countries started to work almost 25 years ago and have developed specific tools, programs and competences in the field of brownfield regenerations. Specific instruments (brownfield regeneration agencies, land planning agencies, etc.) have been created in some European countries and many of them have been proved successful. On the other hand, eastern European countries started facing the problem only few years ago. Thus, the brownfield management situation has evolved heterogeneously within the European Union. Furthermore, while some countries are successfully proceeding, others are in a stagnation phase. In Common Forum (2010) opinion, the reasons for this inactivity are:

- a weak legal framework within Member States and at the European level (lack of an EU directive on brownfield management);
- bad experiences in brownfield regeneration and management of abandoned areas have brought to the generation of new brownfield sites;
- not enough confidence in the so-called remediation innovative technologies (in many case the remediation concept was a mere confinement of the sites).

2.4.1 Brownfield management in the European policy

As summarised in the European Brownfield Revitalisation Agenda (EUBRA, 2007), there can be no doubt that the importance of brownfield regeneration has steadily grown in the context of

⁶ The Treaty of Accession 2003 is an agreement between the European Union and ten countries (Czech Republic, Estonia, Cyprus, Latvia, Lithuania, Hungary, Malta, Poland, Slovenia and Slovakia). It entered into force on 1 May 2004.

⁷ The Treaty of Accession 2005 is an agreement between the member states of European Union and Bulgaria and Romania. It entered into force on 1 January 2007.

European policies (Tölle, et al., 2009). This aspect is particularly true in the field of urban development.

Effective urban land use is central to Europe's current and prospective strategies to achieve sustainable development during the 21st Century. Moreover, over 80% of the EU's citizens are living in urban areas (EC, 2004). Also, a high quality urban environment contributes to the priority of the Lisbon Strategy to make Europe a more attractive place in which to work, live and invest (Tölle, et al., 2009). The brownfield agenda is therefore an essential component of the urban sustainability program set by the European Community which is described in the "Sustainable Urban Development in the European Union" (COM(98)605) and the Environmental Action Programme⁸ (CABERNET, 2006).

Some EU Member States have already created a national strategy to face the brownfield issue while other EU countries are beginning now to develop new policies and regulations on this topic. The European Commission supports these strategies and has adopted several policy instruments like the Framework Program for Research and Development; the Thematic Strategy on Urban Environment; European Regional Development Funds (ERDF) etc., which include specific brownfields related measures (EUBRA, 2007). Moreover, since 2007 EU Member States are encouraged by the Community Strategic Guidelines on Cohesion (GSC) to initiate programs on urban areas (e.g., to promote internal cohesion within urban areas by improving the situation of deprived neighbourhoods, redeveloping brownfield sites and developing their historical and cultural heritage) (URBACT, 2010).

Despite the recognition that the generation and presence of brownfields is becoming a major concern often mentioned in European development policies, a regulatory framework on brownfield regeneration process is still missing in Europe. This reflects the lack of a common definition of the problem across the Member States (US EPA, 2009). In the absence of specific EU legislation to address the brownfield problem, Member States apply other European directives and national legislations.

The set of problems on environmental liability with regard to the prevention and restoration of environmental damage has been dealt with Directive 2004/35/EC (APAT, 2006). It applies a

⁸ The 6th Environmental Action Programme has expired in July 2012. The European Commission has proposed a new Environment Action Programme for the EU. Entitled "Living well, within the limits of our planet", it will guide environment policy up to 2020. The proposal aims to enhance Europe's ecological resilience and transform the EU into an inclusive and sustainable green economy (EC, 2012).

‘polluter pays’ principle, according to which the polluter is responsible when environmental damage occurs. In addition to the EU Directive on Environmental Liability, other EU directives support the management of brownfield:

- the EU Waste Framework Directive (2006/12/EC) addresses the prevention of pollution from waste and defines any contaminated materials, substances or product resulting from remedial action with respect to land as waste;
- the EU Water Framework Directive (2000/60/EC) requires a program of measures, including measures to address land contamination that causes water pollution, by 2015;
- the EU Groundwater Directive (2006/118/EC) establishes a regime that sets groundwater quality standards and introduces measures to prevent or limit inputs of pollutants into groundwater; it complements the Water Framework Directive (WFD);
- the EU Integrated Pollution Prevention and Control Directive (2008/1/EC), or ‘IPPC Directive’, requires industrial and agricultural activities with a high pollution potential to have a permit. This permit can only be issued if certain environmental conditions are met, so that the companies themselves bear responsibility for preventing and reducing any pollution they may cause.

Regarding the soil compartment, two important instruments need to be mentioned. In 2006, the European Commission adopted the EU Thematic Strategy for Soil Protection (COM(2006)231) and a proposal for a Soil Framework Directive (COM(2006)232). Their specific aim is to protect soils across the EU (European Commission, 2012).

The EU thematic strategy explicates the reasons why it is important to ensure a high level of soil quality and sets objectives and measures to protect the soil compartment and to preserve its capacity to perform its functions in environmental, economic, social and cultural terms. The thematic strategy also defines a ten-year long program on soil protection within the EU territory for the European Commission (*ibid.*).

The proposal for a Soil Framework Directive suggests a legislative framework for the protection and sustainable use of soil, by integrating soil protection into national and EU policies, improving knowledge in this area and increasing public awareness (EU, 2011). Regarding the brownfield regeneration topic, the proposal provides guidelines useful to act appropriately in order to prevent soil contamination by dangerous substances. The proposal suggests that member States

should identify the contaminated sites in their national territory and establish an inventory of those contaminated sites. Also, the same Member States should ensure that the contaminated sites listed in their inventories are remediated and should draw up a national remediation strategy (Vanheusden, 2007). Finally, member States are also encouraged to reduce soil sealing – the permanent covering of the soil surface with an impermeable material⁹ - and use land more efficiently. Unfortunately, in 2007, several Member States blocked the proposal for a Soil Framework Directive (COM(2006)232), which is now at a dead end (Vanheusden, 2009).

In conclusion, even if the brownfield issue is recognised in several European policies, it is still lacking of a global, comprehensive, legal framework. This makes brownfield redevelopment in the EU a major challenge for policy makers in the near future.

2.4.2 Perception of brownfields in the different regions of Europe

Three main categories of brownfields have been identified in Europe (Grimski & Ferber, 2001; Bardos, 2003):

- brownfields in declined traditional industrial areas (especially in the coal, steel, textile, chemical and power sectors);
- brownfield in metropolitan areas (which include infrastructures such as railways and docks and some of the 19th century smaller industrial uses);
- brownfields in rural areas (mainly associated with agriculture, forestry, mining or military activities).

The creation of brownfields is not a concluded phenomenon. For example, several industrial facilities have been forced to close because they were not regulated under the current national legislation. Moreover, some new industries or land uses developed on brownfields have not been successful, thus reinstating a derelict or underused condition of the land (Bardos, 2003). Other common problems that characterise the brownfield situation in Europe are specific of the different regions. Such distinctions are identified within a CABERNET study (Oliver, et al., 2005) which is here summarised.

⁹ European Commission (2012) – Guidelines on best practice to limit, mitigate or compensate soil sealing.

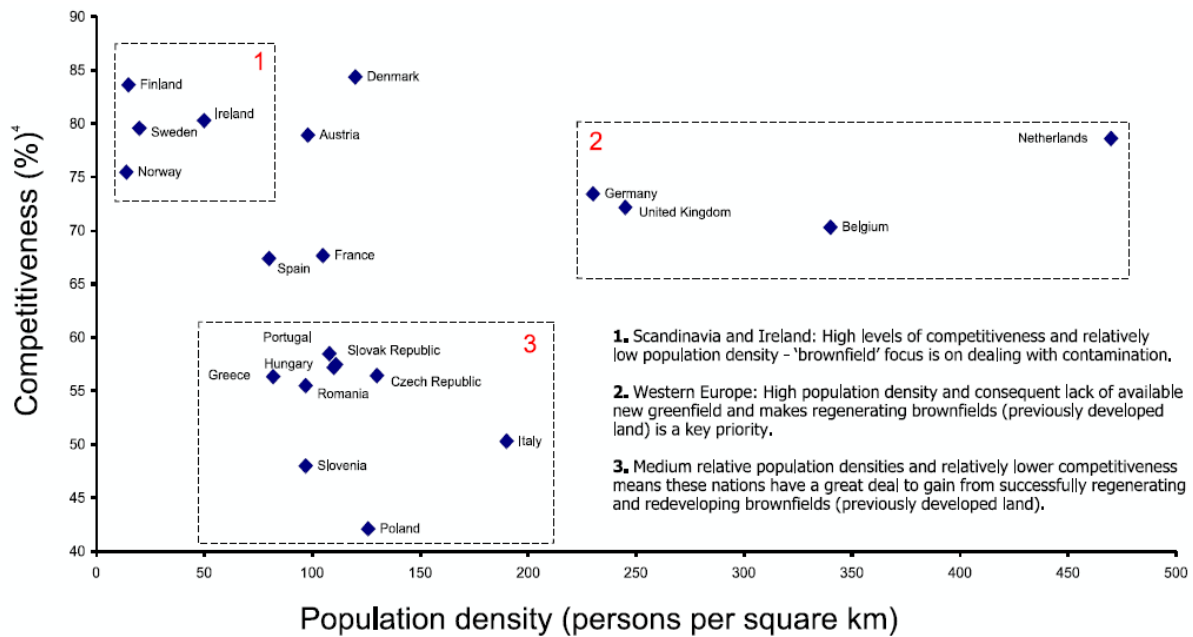


Fig. 2.1 - Population density and competitiveness of selected European nations (Oliver, et al., 2005).

The countries of western Europe (Fig. 2.1, group of Countries n.2) are highly competitive, have high population densities (with the exception of France, although its more heavily industrialised regions are marked by both high population density and high concentrations of brownfield land), and all have densely populated urban regions. Because of these aspects, the amounts of greenfield land available for future redevelopment is becoming increasingly limited with a resultant need to maximise the potential presented by the regeneration of brownfield land. It is therefore possible to affirm that the leading motive of brownfield regeneration seems to be the need to make more land available for development in urban areas.

The northern European countries (Fig. 2.1, group of Countries n.1), characterised by high competitiveness and low population densities, present a different situation. Here, previously developed sites in major and high-developed cities (e.g., Helsinki, Gothenburg or Stockholm) are readily regenerated through private investment and development. On the other hand, it appears to be little perceived need or benefit from the regeneration of brownfields outside of the main urban areas. This leads to a large exploitation of the available greenfield land. The main concern for these countries seems to be related to the remediation of potentially contaminated sites in order to reduce the risks to human health and the environment.

The last identified group (Fig. 2.1, group of Countries n.3) consists of those countries with medium relative population densities and relatively lower competitiveness means. They are

depicted as the countries that can gain the most from maximising the potential provided by the regeneration of brownfields in order to create cities that are more competitive. Fig. 2.2 illustrates the different densities that characterise some European countries. The figure wants to highlight the difficulty to compare different data on number and size of brownfields. This is especially evident by observing the wide difference between Poland and Romania, and the rest of examined countries. Oliver and colleagues (2005) affirm that such big difference might be caused by the fact that there are differences between countries in the way information was collected and the way brownfields are defined. In fact, both in Poland and Romania, brownfields are defined in the same way of contaminated land. This might have significantly altered the quantity, and therefore, surface of brownfields in these countries.

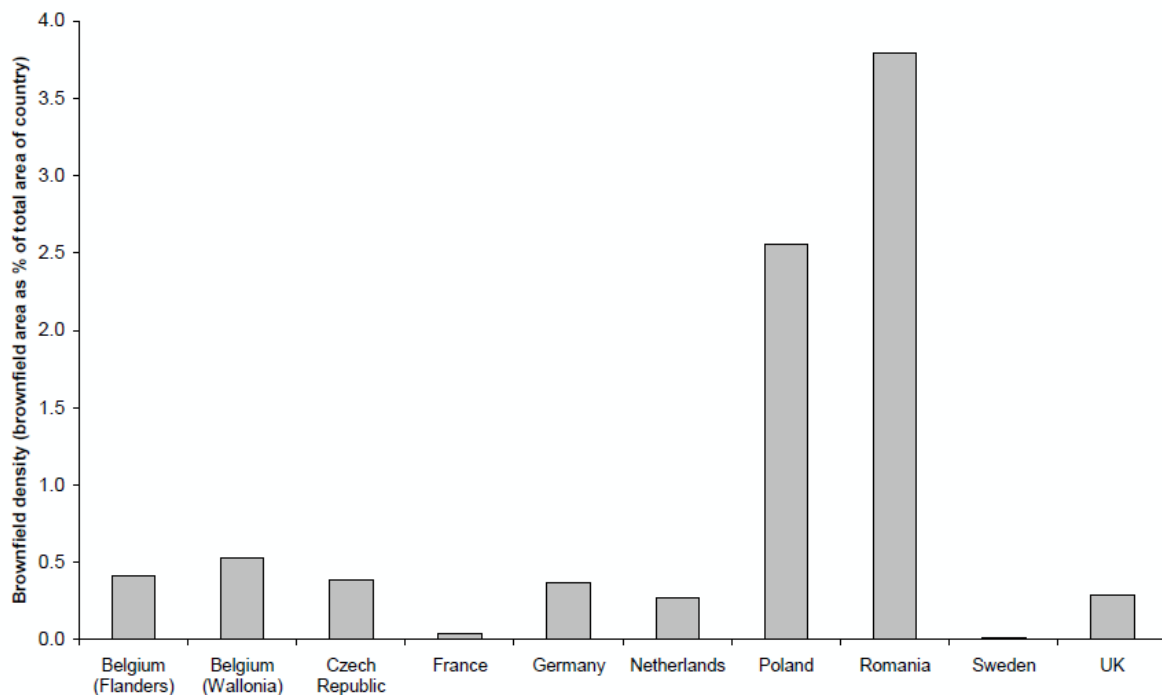


Fig. 2.2 - Density of brownfield land in European countries for which data is available (Oliver, et al., 2005).

2.4.3 Scale of the phenomenon

The most evident aspect of the brownfield European situation is the lack of available data to measure its current scale. In fact, only a few consistent datasets can be used to compare information between countries (CABERNET, 2006). Currently, quantifying the scale of this problem over Europe results being a difficult task (Bardos, 2003). In fact, just few years ago, most European countries could not provide estimates on the scale of the brownfield problem present

their respective territories (Grinski & Ferber, 2001). Moreover, the lack of a common definition and of a legal recognition across Europe of the concept of 'brownfield' make still difficult any direct comparison. Here it is provided information on five countries of the European Union which participated to the TIMBRE project. The information presented here below is obtained from a report of the TIMBRE project reporting the results of a survey on brownfield regeneration (Frantal, 2012).

Czech Republic

The last survey about the evidence of brownfield in the Czech Republic was held in the 2005-2007 period. The results of the study affirmed that 2,355 brownfield were identified within the Czech territory, and they covered a total of 10,300 ha.

Germany

The most recent data in Germany go back to year 2000. The Federal Environmental Agency of Berlin (Umweltbundesamt Berlin), through a study on land use in Germany, estimated that the potential number of brownfield sites in Germany is about 362,000, for a total of roughly 128,000 ha.

Italy

Italy has provided information on the number of contaminated and potentially contaminated sites dating to 2004. From this study it resulted that in Italy around 5,000 sites were recognised as contaminated and other 7,000 were recognized as potentially contaminated. Therefore, in Italy, roughly 12,000 sites were affected by recognised or potential contamination.

Poland

In Poland, an official brownfield database of the country does not exist yet. However, the Ministry of Environment a number equal to 3,230 potential brownfield sites. However, such number seems to be an underestimation of the real quantity of brownfield in Poland.

Romania

In Romania brownfields are associated to contaminated sites. However, an official list of contaminated sites of the country it is not present yet. It is also difficult to obtain an estimate from the few sources that provide a number, because the quantity varies greatly from source to source. The National Environmental Protection Agency (NEPA) estimates that in the last 20 years

the number sites with activities that might originate environmental contamination has increased to 200,000.

3. Stakeholder engagement

3.1. Stakeholder engagement definitions and principles

The definition of stakeholder takes its origins from the corporate world. In 1963, the Stanford Research Institute coined the term defining stakeholders as “those groups without whose support the organisation¹⁰ would cease to exist”. Freeman (1984) gave further popularity to the concept, affirming that a stakeholder is “any group or individual who can affect or is affected by the achievement of the organisation’s objectives”. Subsequently, maintaining an organisation-centric vision, Freeman (2004) adopted a modified form of his previous definition: “those groups who are vital to the survival and success of the organisation”.

Within the two last decades the stakeholder concept, in consequence of its popularity, left the corporate sphere and came into use in a variety of contexts, often with evident differences in the definition of the term. Starik (1994) provides a definition that embraces the whole spectrum of stakeholders. He suggests that “any naturally occurring entity which affects or is affected by organisational performance” can be a stakeholder. This definition does not only include living entities such as animals or plants but also non-living environmental forms (e.g., rocks, water bodies, environmental compartments) (Friedman & Miles, 2006). Starik (1994) proposes that non-living entities can also be those people who have died and those not yet born. In the area of sustainability, this reasoning is often brought into discussion when talking about future generations. Glicken (2000) gives a more physical, adaptable definition of stakeholder, describing it as “an individual or group influenced by and with an ability to significantly impact (positively or negatively) the topical area of interest”.

An aspect that is frequently represented in the stakeholder’s definitions is the concurrent presence of the juxtaposition “can affect or is affected by”. Friedman & Miles (2006) state that such statement is crucial because it stresses the importance of being able to identify all the affected stakeholders in a particular situation. As an example, individuals or groups external to an organisation may feel themselves being negatively affected by the results of a process or by a

¹⁰ An organisation is defined as “a social unit of people that is structured and managed to meet a need or to pursue collective goals. All organisations have a management structure that determines relationships between the different activities and the members, and subdivides and assigns roles, responsibilities, and authority to carry out different tasks. Organizations are open systems: they affect and are affected by their environment.” (<http://www.businessdictionary.com/>) [retrieved 12/01/2013]

decision led by the organisation itself, without its members noticing or acknowledging such negative feelings coming from the outside. In a similar situation “internal” members would not consider the external individuals or groups as stakeholders.

The above-mentioned definitions show the fact that everyone could be argued to have a stake in any particular issue and therefore, potentially everyone is a stakeholder in a specific area of interest. This blurry condition has led to the concept of ‘stakeholder’ being criticised by several authors (Friedman & Miles, 2006) in different ways:

- “A muddling of theoretical bases and objectives” (Donaldson & Preston, 1995);
- “A rather vague and cryptic concept that is open to a wide variety of rather divergent political interpretations” (Hay, 1996);
- “A slippery creature [...] used by different people to mean widely different things which happen to suit their arguments” (Weyer, 1996);
- the term stakeholder becoming “content free” meaning “almost anything the author desires” and the stakeholder debate becoming ‘confused’ and ‘often shallow’ in nature (Stoney & Winstanley, 2001).

Roberts and Mahoney (2004) examined 125 studies that use the term “stakeholder” and found out that nearly two-thirds use it without any reference to a specific definition or they use the same label to refer to substantially different concepts. Nevertheless, including stakeholders in the decision-making process has become increasingly popular in many different fields and policy-makers, regulators, governmental and non-governmental organisations, businesses and the media (as cited in Reed, et al., 2009) now use it.

In every situation is therefore important to be able to identify the specific stakeholders that may affect or be affected by the matter in hand. The stakeholder analysis is, as defined by Grimble & Chan (1995), that “approach and procedure for gaining an understanding of a system by means of identifying the key actors or stakeholders in the system, and assessing their respective interests in that system”. Through stakeholder analysis, it is possible to identify those groups and individuals that will ultimately affect or will be affected by the process and its outputs and therefore to distinguish them from those who are not directly involved or affected.

Being able to identify and select the right categories of stakeholder is of fundamental importance. Each stakeholder has, in fact, different types and content of information and perceptions of an issue and not all of them may result useful in a specific context. Glicken (2000) identifies three types of knowledge from which stakeholders can provide information:

- *cognitive knowledge*: it is based on technical knowledge and expertise. This is the type of information is presented by scientists and other experts on credible and reliable statements on specific issues (e.g., the nature and extent of a potential environmental damage, the most effective methodologies for assessing such damage or the risks of damage, etc.);
- *experiential knowledge*: it is based on common sense and personal experience.;
- *values-based knowledge (social or political knowledge)*: it derives from social interests and is based on perceptions of social value.

The term engagement is an “umbrella” term that covers the full range of an organisation’s effort to understand and involve stakeholders in its activities and decisions (Friedman & Miles, 2006). In other words, it is possible to define the term “stakeholder engagement” as the process through which an organisation engages the identified stakeholders in order to reach clear and shared objectives within an activity (AccountAbility, 2011).

3.1.1 Benefits and possible pitfalls of stakeholder engagement

Engagement of stakeholder is often presented as “a ‘good thing’ and a fairer way to represent views and opinions outside narrow confines of interest and expertise” (Bell, et al., 2012). Here is proposed a list, adapted from Twigg (1999), of potential benefits that the engagement of stakeholders can provide:

- engagement initiatives are able to provide more sustainable decisions because they create and strengthen local capacity and knowledge, provide and give value to different views, and, when successful, they usually lead to shared long-term decisions and plans;
- connecting with stakeholders can help decision-makers to develop a better understanding of the area in which they work, thus allowing them to produce better and

more effective results. At the same time, stakeholders can better understand how the decision-making process work and how they can influence its outcomes;

- such mentioned connections can strengthen relationships between the different stakeholders and decision-makers. Participants can gain confidence, technical skills, ability to cooperate, consciousness, awareness and critical judgement. As a result, individuals and groups feel themselves more empowered and able to influence decisions;
- it is respected the people's right to participate in decisions that affect their lives and activities. Engagement process have the potential ability to guarantee equity in how decisions are carried out and to provide solutions for conflicting situations;
- the inclusion of a stakeholder engagement process may take longer than conventional decision-making processes but, on the other hand, may be more cost-effective in the long term because of the here mentioned advantages.

On the other hand, stakeholder engagement may create some sort of obstacles. The Netherlands Climate Change Studies Assistance Programme (NCCSAP, now NCAP - Netherlands Climate Assistance Programme) (2005) listed a set of pitfalls that are here adapted and summarised:

- exclusion of key groups or individuals: key groups or individuals might be excluded from the engagement process, and therefore not able to influence the final decision with their opinions. As a result they might not accept the outcome and the process might fail. It is thus important to have a clear understanding of who might be the key stakeholders;
- differences between technical and non-technical stakeholders: scientists and other technical experts often use professional terminologies and lay people might be unable or discouraged to participate. On the other hand, scientists may perceive some sort of limitation when their provided information, in order to be simplified, is explicated into lay terms. It is therefore important to define carefully how to integrate the more qualitative information with the quantitative;
- lack of planning and forethought: a lack of planning in the engagement process might reduce the effectiveness of the engagement process. As much attention needs to be paid to the development and management of the engagement process as to the collection and analysis of scientific data.

- lack of clarity in setting the objectives: it is fundamental to define the objectives of the engagement process. Moreover, it is important to be aware of the limits imposed by the available resources (time, funds, etc.) in order to define what is realistically possible. Such preventative measures can avoid to create false expectations in participating stakeholders;
- poor facilitation: the facilitator has a very important function within the stakeholder engagement process. If the facilitator is not able to guide and manage the process, this is likely to fail. Facilitators should be ductile and being able to rapidly adapt to the different situations that an engagement process may present in order to adapt to the needs of the participants and obtain appropriate information.

3.1.2 Best practices for an effective stakeholder engagement

Several authors have identified specific key features of best practices for an effective stakeholder engagement. Here are summarised the results of a literature review of different authors.

Stakeholder engagement must emphasise empowerment, equity, trust and learning

The first component of an engagement philosophy is the need to empower participants through participation. This can take form by ensuring that participants have the power to really influence the decision (Tippett, et al., 2007) and the technical capability to engage effectively with the decision (Richards, et al., 2004). If a decision has already been made or cannot really be influenced by stakeholders, then participation is not appropriate. In addition, stakeholders need to feel that the other members of the process will hear their views respectfully. Finally, stakeholders must have the knowledge and capabilities to participate. For this reason, when decisions are highly technical, it may be necessary to educate participants and developing their knowledge and confidence, which are necessary for the effectiveness of the engagement process (Reed, 2008).

Stakeholder engagement should be considered as early as possible and throughout the process

Stakeholder engagement should be considered from the very beginning, from concept development and planning, through implementation, to monitoring and evaluation of outcomes. An early involvement has been considered essential in order to obtain high quality and durable

decisions (Reed, et al., 2006). Stakeholders should also be involved in monitoring and evaluating the outcomes of the process (Estrella & Gaventa, 2000).

Relevant Stakeholders need to be analysed and represented systematically

“Stakeholder analysis is a process that defines aspects of a social and natural system affected by a decision or action, identifies individuals and groups who are affected by or can affect those parts of the system, and prioritise these individuals and groups for involvement in the decision-making process” (Reed & Dougill, 2010). Identifying stakeholders is usually an iterative process carried out through different methods such as expert opinions, focus groups, semi-structured interviews, snowball sampling¹¹, or a combination of these methods. Moreover, stakeholders should be identified in an open and transparent manner (NCCSAP, 2005). Once the stakeholders have been identified, they can be characterised and classified in order to evaluate their interest and influence in the system. Finally, it is also important to investigate and define the relationships that exist between the selected stakeholders in the context of a particular system (Reed, 2008).

Necessity to define clear objectives through the selected stakeholders

It is essential to clearly define the goals through which the group of stakeholders will be working. An engagement process should adopt the “shared adversity principle”, which recognises that trade-offs are inherent to decision-making. If the goals are developed through dialogue between stakeholders, they are more likely to take ownership of the process, partnership building will be more likely and the outcomes are more likely to be relevant to stakeholder needs and priorities, thus motivating their engagement (Lynam, et al., 2007). Defining clear objectives allows determining the appropriate level and techniques and methods of engagement (Reed, 2008).

Necessity to select tailored methods of engagement through a deep consideration of the situation

Participatory methods can only be chosen once the objectives of the process and the level of engagement have been defined. The level of engagement is a major factor determining the methods that are likely to be selected. Method must also be adapted to the decision-making context, including socio-cultural and environmental factors (Reed, 2008). Finally, methods must be adapted to the relevant stage in the process and to changing context (Richards, et al., 2004).

¹¹ Snowball sampling is a non-probability sampling technique where existing stakeholders recruit other actors from among their acquaintances in the later stages.

Time for the process

Lack of time is one of the most common constraints. An effective engagement process usually lengthen the duration of the projects as more time is required in order to accomplish all the tasks needed to develop the involvement process such as building partnerships and strengthen networks between stakeholders, raising awareness, and building trust (NCCSAP, 2005).

Highly skilled facilitators

A Facilitator needs to be perceived as an impartial, open to multiple perspectives and cordial person. Facilitators need to be able to maintain positive group dynamics, manage dominating individuals, encourage participants to question assumptions and re-evaluate deep-rooted positions, and get the most out of reticent individuals. Such skills are difficult to learn and they tend to be developed through years of experience (Richards, et al., 2004).

Feedback and flexibility

An engagement processes should be very flexible. If one technique is not working, another can be used or the questions changed to obtain the required information and objectives. However, this flexibility needs to be early planned and the available time must be enough in order to get feedback on how effective the process is and potentially change it (NCCSAP, 2005).

3.1.3 Levels of engagement

Approaches to stakeholder engagement vary from passive interactions, where the stakeholders only provide information, to a level where the stakeholders themselves initiate and design the process. The most important contribution to this topic comes from Arnstein (1969) with her “ladder of citizen participation”, in which she defines eight levels of citizen participation in the political and economic processes of a society. In her ladder, Arnstein admits that the model is a simplification of reality, that “there might be 150 rungs with less sharp and pure distinctions among them”. She highlights the distinction between ‘powerful’ and ‘non-powerful’ groups, while in modern stakeholder analysis it is important to identify the degree of engagement of the different involved groups (Friedman & Miles, 2006). Several authors have adapted new ladders of participation for specific contexts. In Fig. 3.1 an adapted version from Conde and Lonsdale (2004) is proposed.

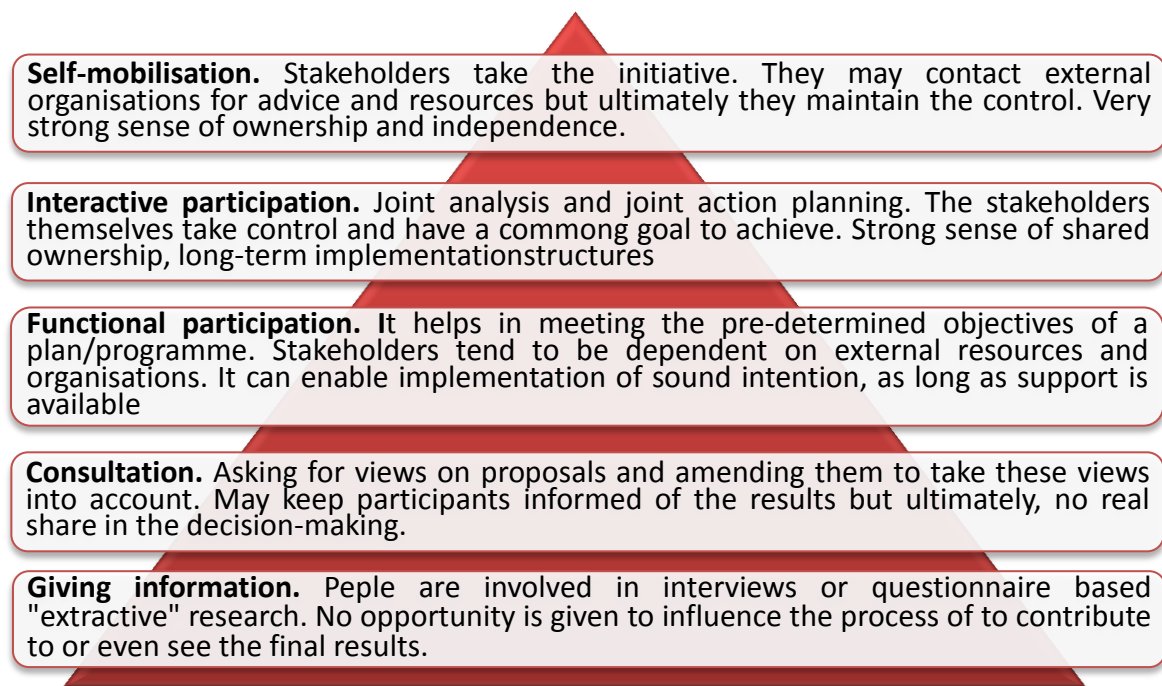


Fig. 3.1 - Ladder of participation. Adapted from Conde & Lonsdale (2004).

It is important to highlight the fact that this is not a scale from 'bad to good' engagement. Conducting the stakeholder engagement at its fullest (self-mobilisation in Fig. 3.1) might not be the most effective way to deliver the process. In reality, it is more likely that different stakeholder groups and the same stakeholder groups at different times will be treated at different levels.

3.1.4 Stakeholders in the scientific research field

The engagement of stakeholders has found place also in the research world. The EU research policy links research agendas with societal challenges and increasingly emphasises the need for exchange of knowledge between researchers and non-research actors in order to enhance the quality, relevance and legitimacy of research and its impact, as cited in Jolibert & Wesselink (2012). These authors define the non-research stakeholders as "all users of, and those (directly and indirectly) affected by or benefiting from, research projects". These actors can be citizens, businesses, consumer groups, NGOs, public institutions, policy-makers from government and agencies, scientists, the media and other potential beneficiaries (EC, 2009).

The interaction between science and society is not a simple matter of linear knowledge transfer from research to policy and practice but rather a multi-faceted, multi-directional process

(Jolibert & Wesselink, 2012). To make this possible it is necessary to create a knowledge transfer framework composed of: knowledge facilitators able to translate knowledge from the scientific community to another (Pielke, 2007) and participatory platforms (Renn, 2006) that allow a co-production between researches and non-technical stakeholders (Jolibert & Wesselink, 2012).

Jolibert and Wesselink (2012) believe that stakeholder engagement in research can support sustainability learning in society and being useful for the objectives of the research projects but, at the same time, they acknowledge that stakeholder involvement in scientific research may also undermine the perceived strength of the research. Moreover, Lovbrand (2011) affirms that the engagement of non-research stakeholders has the potential to enhance the immediate usefulness because scientists would be more compelled to justify the benefits of their research, which would be directly related to stakeholders' needs. On the other hand, stakeholder engagement can block more critical and reflexive research that would ultimately lead to more innovation since stakeholders could be more focused on their short-term objectives and less likely to take risks.

3.2. The stakeholder engagement process

Every engagement process must be tailored for different needs and requirements. However, it is possible to identify a number of recurring phases that are fundamental for an effective involvement. Four phases are often identified in different authors (AccountAbility, 2011; BSR, 2012; IFC, 2007): planning, preparation, implementation, and review and improvement.

3.2.1 Early planning

Before beginning a stakeholder engagement process it is important to think and define who needs to be involved, over what topics and for which purpose. A good planning can help reducing the lengthiness of the process, reducing its costs and helping in maintaining the defined objectives (IFC, 2007). Important key issues that may be considered in this phase include the following:

- purpose of the engagement process: the reasons why a stakeholder engagement process should be undertaken are defined (REVIT, 2007);

- stakeholder identification: identification of the stakeholder categories that need to be involved in the engagement process. The administrators of the process should profile and map the stakeholders in order to properly address the other key issues (AccountAbility, 2011);
- priority issues: identification of priorities, issues and needs that characterise the involved groups and individuals involved in the engagement process (BSR, 2012);
- resource requirements: defining the resources required for the engagement process and making the necessary changes in response to its outputs results fundamental. Resources can be subdivided into financial, human (including capacity building), temporal and technological (AccountAbility, 2011);
- engagement level: definition of the level of involvement necessary to obtain the desired outcomes (see Paragraph 3.1.3). By doing this it is possible to define the nature of the relationship between stakeholders and owners of the engagement process. The engagement process, depending on the selected categories of stakeholders and on the phases of the process itself, may be characterised by different levels of engagement (*ibid.*);
- techniques and methods of involvement: identification of the most effective techniques and methods of communication for dealing with the involved stakeholders (Australian Government - Department of Immigration and Citizenship, 2008). They should also be selected by considering needs, capacity and expectations of the involved stakeholders. More than one method may be selected and utilised in different phases of the process;
- responsibilities: it is important to define the responsibilities within the engagement process such as timetables, lines of reporting and boundaries of disclosure. It is also fundamental to strictly define what information the administrators of the engagement process will share with the stakeholders and what information stakeholders may share outside of the engagement process (AccountAbility, 2011).
- documentation: it is decided how and which methods are used to capture, record, track and disseminate the minutes and results of the engagement process.

3.2.2 Preparation of the engagement process

Once the planning of the engagement process has been defined, the preparatory phase begins. In this phase it is necessary to (AccountAbility, 2011):

- identify and gain the necessary resources: resources should be identified and confirmed in order to be able to proceed with the engagement process;
- build capacity: if needed, capacity to engage needs to be built. Those responsible for the engagement process should collaborate with stakeholders in order to respond appropriately to their needs and doubts so as to enable an effective engagement. Engagement processes usually involve people with different levels of expertise, confidence and experience and some groups or individual may find it difficult to participate in the process for different reasons (e.g., knowledge, language and communication skills, availability of time to participate);
- Identify engagement risks: possible risks should be identified as soon as possible. Engagement risks might include conflicts between participating stakeholders, unwillingness to engage, creation of false expectations, disruptive stakeholders, uninformed stakeholders and disempowered stakeholders. Clear ground rules should be established and all participants should agree to them.

3.2.3 Implementation of the engagement plan

Stakeholders should be invited to participate in advance and communications should be appropriate for each stakeholder. The invitation should include (IFC, 2007):

- the purpose and scope of the engagement;
- the engagement process and the expected timelines;
- what stakeholders are expected to contribute;
- the benefits of the stakeholders invited to participate;
- logistical and practical information about the engagement process;
- additional information that will be provided.

Moreover, invitations should be personal and not generic. Different means should be considered in order to engage stakeholders in the engagement process, and the most adapt should be

selected. Different factors should be considered in order to find the most effective means. Examples of methods currently used are social networks, media, mailing lists, telephone calls and personal visits. Moreover participants should be provided with the briefing materials needed to ensure the success of the engagement. This should be done in advance and it should take into account any relevant language, disability or literacy issues (AccountAbility, 2011).

At the beginning of the engagement it should be established a sum of procedural and behavioural ground rules (e.g., stakeholder should respect the right to “pass” the turn at speaking of others, allow to express everyone’s opinion, to give the opportunity to respond the others) for the participants in the engagement. All participants should agree to these rules. During the engagement, the facilitator should pay attention in order to notice all the potentially initiating causes that may give birth to specific issues and therefore intervene in order to solve it. With the agreement of the participants, audio, video or photographic records of the engagement can be made (BSR, 2012).

At the end of the engagement process, the whole situation and its outputs should be analysed. Every output should be analysed and reasons for the chosen decisions and actions should be defined. The outputs of the engagement process should be communicated to participants in an appropriate and timely manner (*ibid.*).

3.2.4 Review and improvement

The whole process should be monitored and evaluated by the owners of the process. Such monitoring should be used to further improve the adopted engagement method and it should include (IFC, 2007):

- commitment and integration;
- purpose, scope and stakeholder participation;
- process (planning, preparing, engaging, reviewing and improving);
- outputs and outcomes;
- reporting.

3.3. Stakeholder engagement methods and techniques

Stakeholder engagement encompasses relationships built around one-way communication, basic consultation, in-depth dialogue and working partnerships. Choosing the right approaches for the engagement process is not a technical question about one method versus another but about understanding the factors, risks and opportunities associated with the objectives that made necessary the adoption of a process able to involve stakeholders (Partridge, et al., 2005). Here, three different approaches for stakeholder engagement that are used within this work of thesis are described: focus groups, workshops and questionnaires.

3.3.1 Focus groups

Focus groups are a special type of group used to gather information from members of a clearly defined target audience. They are characterised by being composed of six to twelve stakeholders who are similar in one or more aspects and are guided, through a discussion, by a facilitator on a clearly defined topic, in order to gather information about the opinions of the group members (Rennekamp & Nall, 2003).

In other words, a focus group is a qualitative interviewing technique used to explore people's beliefs, attitudes and opinions. The dialogue tends to take shape on its own because stakeholders are encouraged to comment and add richness to the answers given by the members of the group. This would not be possible in a one-on-one interview. One-on-one interviews focus on individuals, while focus groups put their attention on a specific group and they are more interactive and discursive. The nature of focus groups makes them unsuitable for discussing personal or sensitive topics or issues, which are better left to individual involvement methodologies. Formal focus groups, conducted since the 1940s, have been used for different purposes (Höijer, 2008; NOAA Coastal Services Center, 2009):

- stimulate new ideas and concepts for both the researchers and the participants;
- learn about impressions of product and service effectiveness, or management issues;
- learn general information about a specific topic;
- generate new hypothesis for future research opportunities;

- learn how respondents communicate about topics of interest (the words they use, which concepts they adopt and understand, etc.);
- enhance the utility of survey content and delivery mechanisms;
- determine what additional research tools may be useful for follow-up information collection;
- better interpret previously obtained quantitative information.

Again, it is important to keep in mind that the purpose of a focus group is to gather information needed for the decision-making process (Rennekamp & Nall, 2003), not to make a decision or complete a task. Focus group methodology stands alone or works in tandem with surveys and questionnaires, individual interviews or other methods as part of mixed or multi-method studies (Huston & Hobson, 2008).

Focus groups have unique strengths and weaknesses. First, an often-mentioned advantage of focus groups is that they are an economically inexpensive method of gathering qualitative information quickly (Ferber, 1974). Second, they can stimulate the exchange of ideas: participants can add information to the ideas of others, recalling things they might not otherwise recall (Huston & Hobson, 2008). Third, focus groups can help participants in defining and framing their individual points of view by comparing/contrasting it to other perspectives (Morgan, 1997). Finally, they can also help participants in developing and defining their beliefs and stimulating more clearly articulated positions as they seek to explain themselves to others (Freeman, 2006). On the other hand, they have also some weaknesses. Calder (1977) affirms that group discussions can cause participant attitudes to become extreme, which could in turn result in greater unification of group opinions or polarize participants. Moreover, the views and values of some participants may render certain topics off limits. Participants may also convey information that may portray themselves “more favourably”, which could slightly distort gathered information. Finally, emotionally charged issues may result in argument.

Focus groups and surveys: a mixed method approach

A common practice is to use focus groups in combination with other methods (NOAA Coastal Services Center, 2009). One of the most common pairings is with questionnaires (Morgan, 1996). Most commonly, the survey serves as a primary method and the focus group serves a secondary, yet preliminary role. The focus groups are used to assist the development of effective survey questions. The items gathered through the focus groups (terminology used, new ideas, specific

issues of interests, etc.) can help a survey to better reason with a specific group of stakeholders and subsequently yielding higher quality data.

3.3.2 Workshops

A workshop is a meeting during which experienced people in responsible positions come together with experts and consultants to find solutions to problems that have cropped up in the course of their work and that they have had difficulty in dealing with on their own (WHO, 1987). One of the most common methods used in workshops is group discussion of selected problems. The group must be small enough to encourage full participation by each member and large enough for each member to gain from the experience of the others. They are usually undertaken with small (6-15 people) or large groups (15-35 people, as people can be subdivided into smaller groups). The workshop method makes everyone (organisers and participants) responsible for helping to find solutions to the selected problems.

A workshop can be used in a range of circumstances, including the evaluation of a project, event or activity. It can also be used to gather and compare opinions on a range of different aspects, criteria or qualities of a project or activity. Summing up, it is an excellent, interactive way to understand stakeholders' opinions and experiences about a project and give them the chance to challenge the viewpoint of the organisers by raising new issues and/or asking questions back.

Usually workshops are used to gather cross-functional stakeholders in order to discuss and define requirements that affect more than one department. Representatives from each category of stakeholder are needed so that their specific need are represented and prioritised. This way, all the participants understand the various needs and have a facilitated forum to discuss and resolve their issues (Heldman, 2009).

The primary difference between focus groups and workshops are that focus groups are gathering stakeholders with homogeneous attitude towards the discussed topic, while workshops consist of cross-functional stakeholders who can define cross-functional requirements (*ibid.*). As with focus group, the analysis needs to focus on the group interaction data and responses, rather than on single individuals.

3.3.3 Questionnaires

A questionnaire is an individual form of engagement and it consists in a set of questions for obtaining information from respondents. It is a very convenient way of collecting information from a large number of people within a definite period of time (Ng, 2006). It can be delivered in many forms: postal survey, telephone interviews, face-to-face interviews and internet surveys. Each of them requires a different design. A postal questionnaire is any type of questionnaire in which respondents are asked to complete it without the presence of the researcher. This typology of questionnaire should have clear instructions and questions because it cannot be provided any kind of clarification to the respondent. A structured interview is a type of questionnaire in which respondents are asked to complete it by verbally responding to questions in the presence of the researcher.

A questionnaire should always have a definite purpose related to the objective of the research and it needs to be clear from the beginning about how the findings will be used. Respondents should also be informed on how and when they will receive feedback on the findings.

Questionnaires are restricted to two basic types of questions:

- closed-ended (or “closed question”) is a question for which a researcher provides a suitable list of responses (e.g. Yes/No, Likert scale); this produces mainly quantitative data;
- open-ended (or “open question”) is a question where the researcher does not provide the respondent with a set of answers from which to choose but the respondent is asked to answer “in their own words”; this produce mainly qualitative data.

As every engagement methodology, the administration of a questionnaire has advantages and disadvantages (Kirklees, 2008). Pros and cons depend on the typology of questionnaire. It is useful when it is required to contact a large number of people because of the relatively low cost it requires and because it is easy to reach people who are spread across a wide geographical area. Moreover, respondents are able to complete a questionnaire in their own time. On the other hand, responses rate can be lower than other engagement methods and there is little control over who completes a postal questionnaire. Usually, a 20-25% return of questionnaires is considered a good result but such a low percentage may give a false representation of the picture (*ibid.*). It is also difficult to know whether a respondent has understood a question properly and therefore the researcher has to develop clear questions that can be interpreted in

the same way by all the respondents. Postal questionnaires may also be inappropriate for people with disabilities (reading difficulties, blindness, etc.). Finally, questionnaires are time consuming for respondents, more costly and more labour intensive than other methods.

There are no universal guidelines to develop a good questionnaire but there are rules that must always be respected. In brief, a good questionnaire should be valid, reliable, clear, succinct and interesting for the respondents. It should be well explained through an introductory letter describing the purposes of the questionnaire and its functioning. It is also important to design the questionnaire (order, number of questions, etc.) on the strength of its purposes, scrutinise each question and perform a pre-test before deliver the final version the involved respondents (Ng, 2006). Being aware of all these factors can help in maximising the response rate of the questionnaire, improving the validity of the research.

Piloting the questionnaire

Once the questionnaire has been developed it is important to pre-test it. Often, questions may look clear to the researcher but not to the respondents. It is therefore good practice to “pilot” the questionnaire with a small sample of respondents before use. The pilot questionnaire should check stakeholder’s understanding and ability to answer the questions, highlight areas of confusion and provide an estimate of the average time the questionnaire will take to be completed. Any amendments highlighted by the pilot should be made to the questionnaire before issuing a final version (Kirklees, 2008). For a better understanding, it is important to ask the respondent to comment specifically during the pilot test (Ng, 2006).

3.4. Stakeholder in the brownfield regeneration

Brownfield redevelopment projects by their nature tend to be complex because it is not just about overcoming “technical issues to remove contamination or other physical problems with the ground” (Dixon, et al., 2007). In fact, one of the key challenges of brownfield regeneration is the diversity of professions and stakeholders involved in the process. The need for stakeholder engagement becomes increasingly apparent the larger and more complex a brownfield regeneration project becomes (REVIT, 2007). The brownfield topic involves so many scientific and social disciplines that it is difficult not only to understand how the whole system works, but also to define the limits (EEA, 2002). Even the stakeholder categories that can or can be influenced by brownfield regeneration are numerous. Different stakeholders have different perspectives and different needs. Therefore, an important factor of the process is the ability to integrate these viewpoints in order to achieve agreed decisions and sustainable outcomes for the regeneration process. The action of bringing brownfield land back into active use has taken on a new urgency among the various stakeholder categories involved in the process, but too often the study and management of brownfield regeneration had been carried on by working on specific tasks and individual components of the process (Dixon, et al., 2007; CABERNET, 2006). Such methodology has led to fragmentation in thinking and of proposed solutions. Therefore, it does not allow to fully incorporate the various aspects of a regeneration process, thus negatively influencing the outcomes. A lack of understanding and communication amongst the involved stakeholders can significantly affect the whole process of regeneration of a brownfield.

CABERNET (2006) affirms that because of such problems a multi-stakeholder engagement can be a useful tool which allow involved actors to formulate solutions for complex issues such as the regeneration of a brownfield. A multi-stakeholder approach can increase the understanding of stakeholder positions and interests, strengthen relationships between them and develop new partnerships, and finally create consensus on topics between different groups. Proposed solutions for the regeneration of brownfields are more likely to be successful if they come from a multi-stakeholder approach that has taken into account all the perspectives, opinion and values of the involved stakeholders.

3.4.1 The actors network in the regeneration of brownfields

The actors involved in the regeneration of brownfields vary with the scale and complexity of the specific sites that need to be regenerated. There are different categories of stakeholders such as landowners, developers, supporting specialists and governmental and community agencies. All of them have a disparate range of goals, demands, perceptions, requirements, resources, strategies and constraints. Stakeholders can influence the direction of the regeneration process in different ways (Dixon, et al., 2007).

The structure of the stakeholder network can have an important impact. Formal and informal actors that compose the network can form coalitions or partnerships of some kind in order to protect their common interests. Such partnerships have the potential to exclude other actors and to be selective in the objectives and agreements of the regeneration process. Another element that can influence the direction of a regeneration process is the role of communication between stakeholders. A good communication, understanding and trust between the involved actors can help to generate shared objectives and approaches to brownfield regeneration. Summing up, when searching actors and their relations in the brownfield regeneration process it should be taken into account a range of insights about how these networks of stakeholders are constituted and how they work.

Dixon and colleagues (2007) have identified the diverse range of potential actors in brownfield regeneration, as shown in Fig. 3.2.

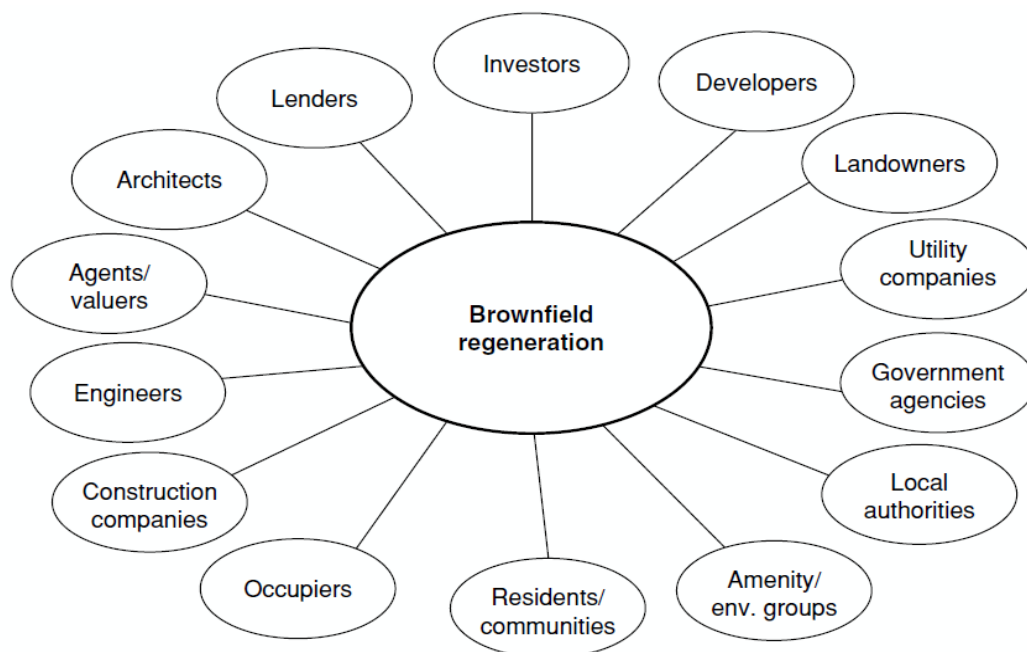


Fig. 3.2 - The simplified network of actors involved in the brownfield regeneration process developed by Dixon et al. (2007).

As stated above, every category of stakeholder have different ideas and perspectives. Academics such as Adams and colleagues (2002) and Syms (1999) have identified the main driving forces structuring stakeholders within the brownfield regeneration process. The diagram in Fig. 2.3 simplistically illustrates the main drivers that structure the action of stakeholder in this context. All the factor categories shown in the figure are inherently linked to each other and this suggests that these structural forces are often mutually reinforcing.

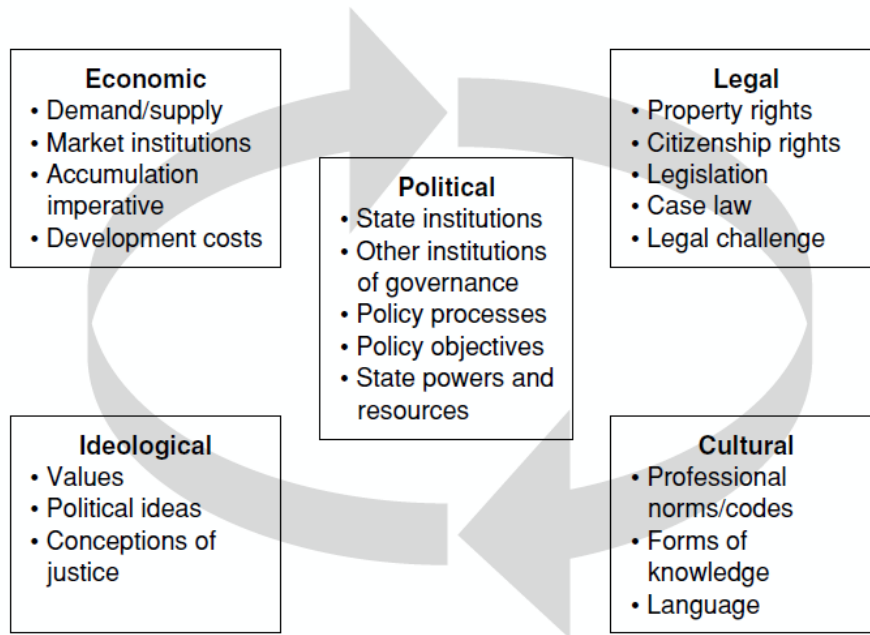


Fig. 3.3 - The main driving forces structuring the brownfield regeneration process (adapted from Dixon et al., 2007).

This complex network of actors involved in the regeneration process shows that it is no longer possible to deal with the management of brownfields in a non-holistic way. It is important to consider all factors and actors through the adoption of a professional approach (REVIT, 2007).

PART B – METHODOLOGICAL DEVELOPMENT

4. Development process of the TIMBRE framework for the collection of information on brownfield regeneration

In order to deal with the brownfield regeneration challenge, several networks and projects have been developed and implemented in recent decades. These research projects, based on the concept of sustainable management of contaminated sites and brownfields, have produced in the last years an abundance of strategies, guidelines, tools, decision support systems, manuals, documented case studies, assessment technologies, as well as risk communication methodologies and tools, which, too often, are not used in their entire potential. Moreover, the various conceptual models of brownfield regeneration have focused on particular aspects of redevelopment rather than seeking to examine the process as a whole (Dixon, 2007). In order to overcome this barrier, Work Package 1 of TIMBRE project decided to develop a web-based Expert System for the collection, analysis and classification of already available information on brownfields (i.e., accessible literature, data and further information on previous projects, programs and other activities dealing with the regeneration of brownfields). Such tool is aimed at supporting the decision-making process of experts and other stakeholders involved in the regeneration process of brownfield by providing them the possibility to search, consult, evaluate and eventually share the information they need.

One of the objectives of this work thesis is the development of a framework for the collection of available information on brownfield regeneration (from now on it will be referred to as “TIMBRE framework”). This framework serves as a structure for the categorisation of the information within the above-mentioned web-based Expert System. The development of the framework comes from the necessity to identify a shared conceptual structure for the collection and categorisation of available information on brownfield regeneration. Such structure should ideally include all the existing phases that characterise the brownfield regeneration process.

Its development has been important for the functioning of the Expert System because it allows to:

- support TIMBRE partners in the development of an expert system that will allow an easy access and an intuitive interface to find and collect relevant information for all partners, end users and stakeholders;

- support TIMBRE partners in collecting information on the brownfield regeneration process (regulations, conceptual frameworks, decision support systems, tools, methodologies, approaches, technologies, etc.) within a structured tool (the expert system);
- support the stakeholders and end-users involved in the brownfield rehabilitation process to find the needed relevant information for each phase of the brownfield rehabilitation process through the use of the timbre expert system.

The framework was developed within a process made up of five different phases, as represented in Figure 4.1. In step 1 the screening and analysis of available literature on previous projects on brownfield regeneration process was realised. Step 2 consisted in the identification of the main phases of the brownfield regeneration process through the study of the frameworks developed in the previous research projects on brownfield regeneration. Step 3, namely the engagement of stakeholders, allowed to obtain data, comments and suggestions from multiple professional sources. In step 4, the information collected during the stakeholder engagement phase were evaluated and implemented in the final version of the TIMBRE framework. Finally, in step 5, this final version was presented to TIMBRE partners and to those stakeholders who expressed the willingness to continue the collaboration for the development of the web-based Expert System.

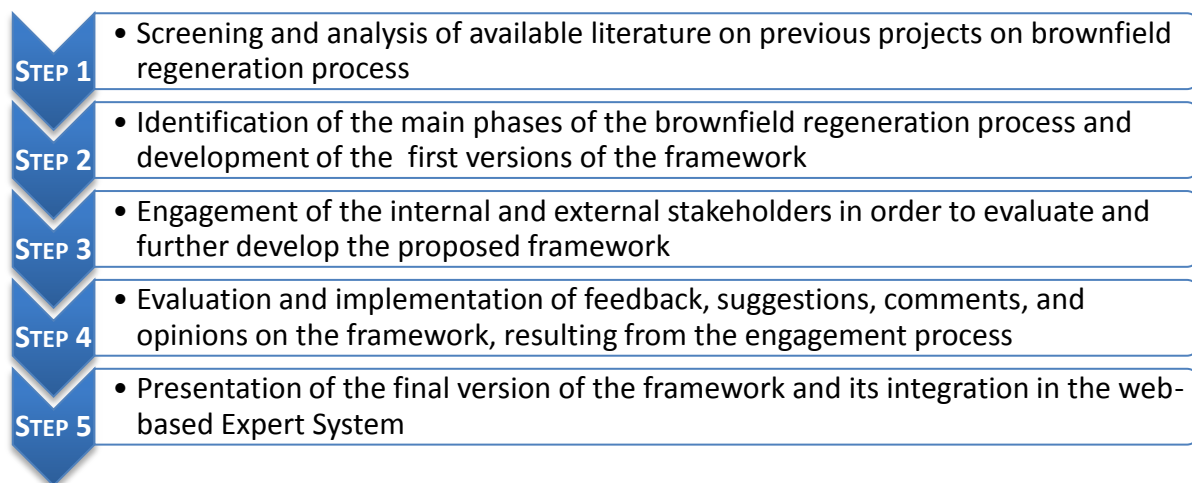


Fig. 4.1 - Development process of the TIMBRE framework for the collection of information on brownfield regeneration.

Hereinafter the five single steps of the TIMBRE framework development process are described in detail.

4.1. Screening and analysis of available literature on previous projects on brownfield regeneration process

In order to face the problems generated by the presence of brownfields, several networks and projects have been developed. These projects have produced a large number of approaches and conceptual frameworks as well as manuals, decision support systems, guidelines and tools intended to produce a wide impact, but so far, their practical use has been quite limited. In particular, many conceptual frameworks have been produced, but too often they do not comprehend all aspects of the brownfield regeneration process.

The first step of the TIMBRE framework development process consists in the selection and analysis of a number of these previous projects related to the brownfield regeneration topic. The aim of this first step is to collect all the available information in order to develop, at a later stage, a complete framework containing all the phases characterising the brownfield regeneration process. Thirty five international and European projects, that produced decisional frameworks for the brownfield regeneration process or for particular aspects of it, are selected. Here below, four projects that have a particular relevance in the development of the TIMBRE framework are briefly described.

Decision Support System for the Requalification of Contaminated Sites (DESYRE)

The DESYRE project focuses on the rehabilitation of contaminated sites. Contamination can be an important factor when dealing with brownfields. In fact, a number of them may be affected by real or perceived contamination. The rehabilitation of contaminated sites is a complex process encompassing technological, environmental and socio-economic aspects. In DESYRE (Carlon, et al., 2007), the process of contaminated site management is divided in three main steps: site characterisation and data processing, evaluation of the risk, choice of proper remediation technologies. DESIRE is a GIS-based software that supports the assessment and management of contaminated mega-sites and tries to solve the identified problems by giving to the experts a comprehensive view of the rehabilitation process, which allows to choose the best solution for remediation. This software is composed of five modules (Fig. 4.2) (Critto, et al., 2002):

1. **characterisation:** this module allows to collect all the available information on the site and provides the definition of efficient sampling strategies, contaminants distribution, prediction of transport processes and input parameters for the risk assessment module;
2. **risk assessment:** it includes exposure and risk assessment models and provides outputs such as risk maps;
3. **socio-economical:** it addresses socio-economic constraints and benefits;
4. **technical analysis:** it allows to assess the feasibility, advantages, limits and costs of different clean-up technologies;
5. **decision-making:** it integrates information, mainly in the form of indicators, from the three assessment modules by means of the multi-criteria analysis (MCDA).

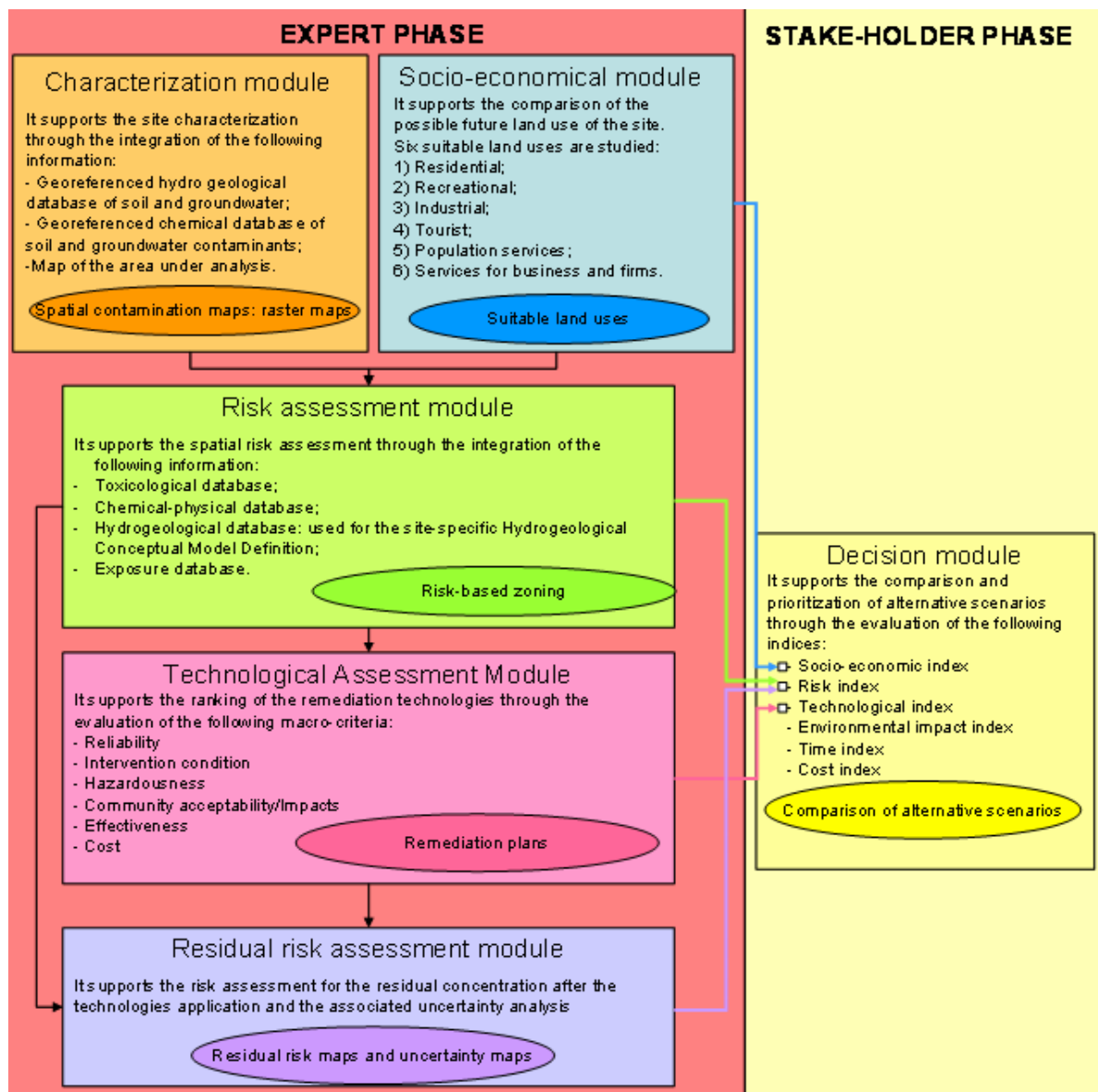


Fig. 4.2 - Structure of DESYRE - Decision Support System for the Requalification of Contaminated Sites (Carlón, et al., 2007).

Regeneration of European Sites in Cities and Urban Environment (RESCUE)

RESCUE is defined in one of its reports as “the first project which was designed to integrate the diverse disciplines and stakeholders which are involved in brownfield regeneration in order to satisfy both the demands of sustainable development and the different socio-economic, legal and political conditions in its participating countries” (RESCUE, 2005).

The main objective of RESCUE is to learn from the previously adopted practices in the countries of the members participating in the RESCUE project in order to develop an “integrated approach for the sustainable regeneration of brownfield sites in Europe” (*ibid.*). Within the RESCUE project, different tools and approaches for the different actors involved in the brownfield regeneration process (e.g., owners, planners, architects, engineers, public authorities) have been developed. One of the tools developed within RESCUE project is a roadmap of the brownfield regeneration process that highlights the relationships between phases, activities and stakeholders of the process itself. The RESCUE Roadmap is represented in Fig. 4.3.

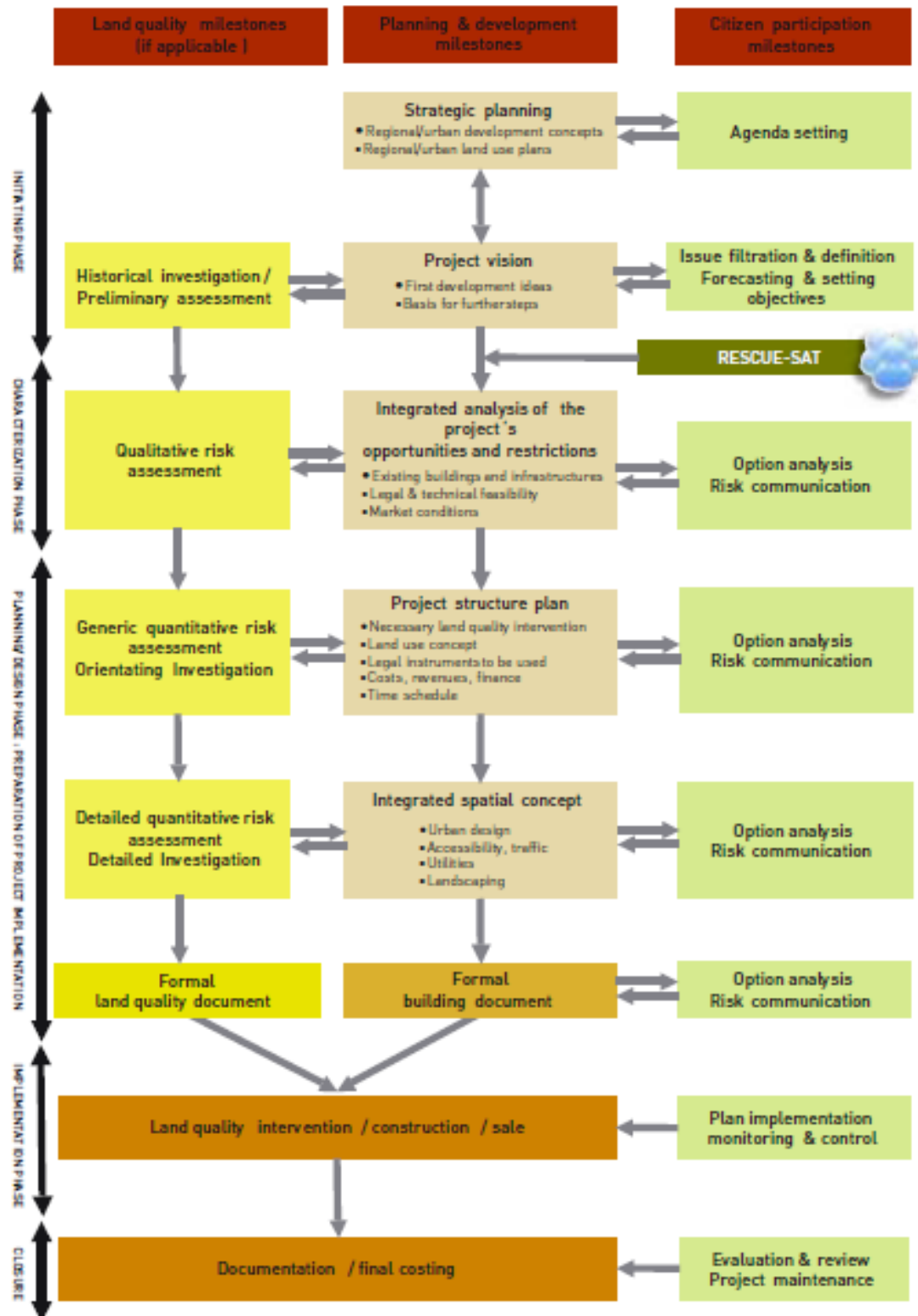


Fig. 4.3 - RESCUE roadmap of a holistic brownfield regeneration project illustrating stakeholder involvement in the various project phases (RESCUE, 2005).

Network Oriented Risk assessment by In situ Screening of Contaminated sites (NORISC)

NORISC, acronym of Network Oriented Risk assessment by In situ Screening of Contaminated sites, is “a technology development project under the 5th Framework Programme of the European Commission that provides an integrated site investigation methodology focusing on in situ and on site techniques for a more accurate environmental assessment of contamination profiles in urban areas” (NORISC, 2001). Its primary objective is to provide a Decision Support System (DSS) which serves as guideline for the improvement of the efficiency of characterisation and risk assessment of contaminated sites within urban areas.

Another objective of NORISK project is the development of a risk assessment software (NORISC HRA), which provides a procedure for assessing the human-health risks in contaminated sites within urban areas. NORISC HRA can provide stakeholders with useful information on the level and spatial distribution of human health risk on a contaminated site. It can also be used as a tool for the selection of the most appropriate clean-up option and for the design and management of the regeneration process of a contaminated site. Fig. 4.4 shows the NORISC risk assessment process for the revitalisation/remediation of contaminated sites.

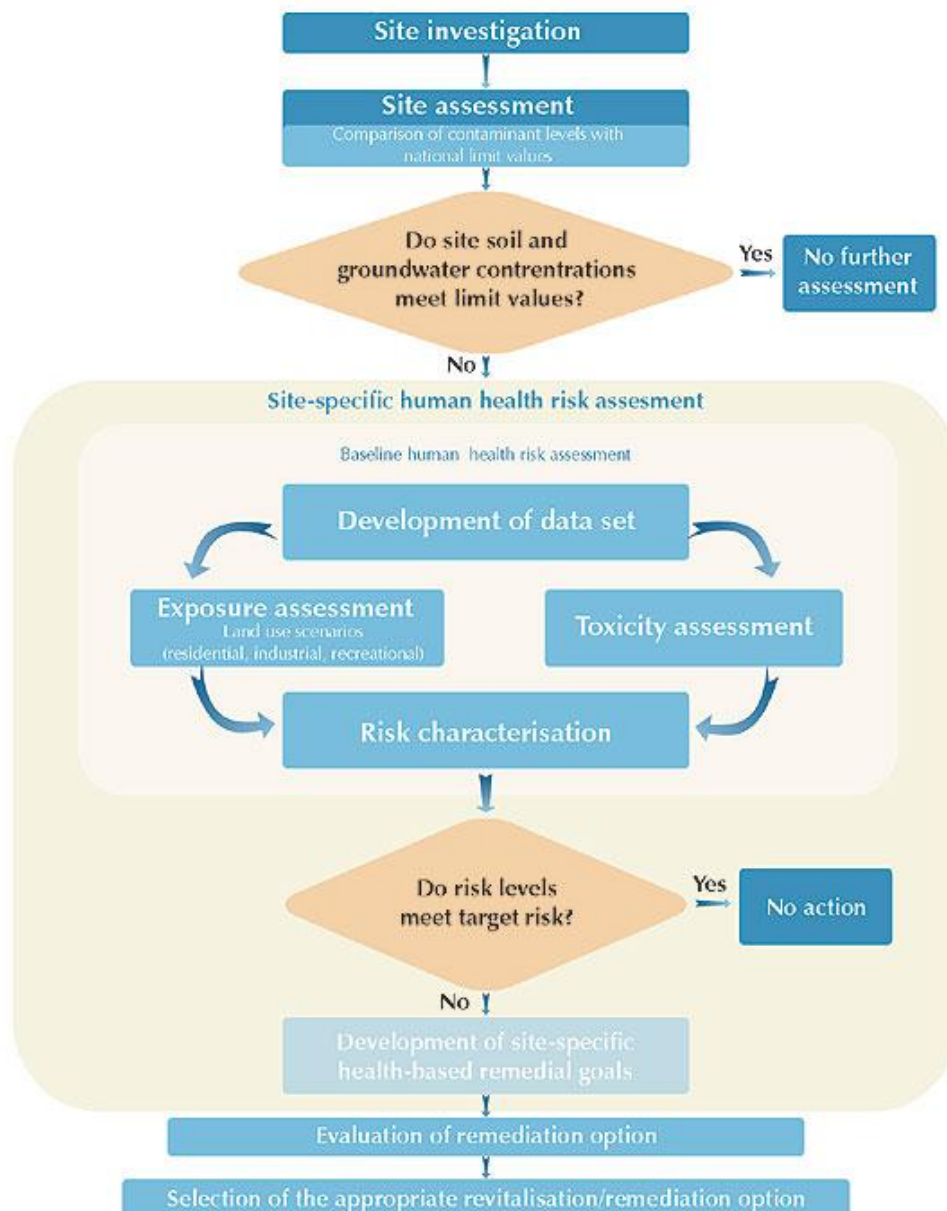


Fig. 4.4 - Representation of the NORISC risk assessment process for the revitalisation/remediation of contaminated sites (NORISC, 2001).

Concerted Action on Brownfield and Economic Regeneration Network (CABERNET)

CABERNET is a “European multi-stakeholder network that focuses on the complex issues that are raised by brownfield regeneration. It provides new management strategies, innovative tools and solutions for a number of the key economic, environmental and social issues that affect brownfield regeneration” (CABERNET, 2006). The network answers the need for a multi-stakeholder approach, identifies gaps in national and international regeneration approaches, and categorise tools that have been successfully used in brownfield regeneration. Moreover, it

develops new brownfield regeneration approaches, good practices for stakeholders, and conceptual models. It also proposes benchmarks for policies, programs, organisations and projects (*ibid.*).

The five conceptual models developed within the CABERNET Network aid the understanding of the brownfield regeneration process through a visual representation that allows them to hypothesise, or demonstrate, the relationship between different elements of system that are often difficult to represent in an accessible way:

- Bath model: it represents the dynamics of brownfield creation and redevelopment;
- A-B-C model: it characterises the drivers for economic viability of brownfield redevelopment ;
- Football model: it highlights different stakeholder interests and perspectives, and identifies the key drivers for redevelopment. Through this tool, stakeholder can list and prioritise the drivers of a regeneration project (Fig. 4.5);
- Land use puzzle model: it demonstrates the interconnected nature of brownfield distribution, land development and land use cycle;
- Interaction model: it demonstrates interaction between social, environmental, economic and governance factors in urban systems.

CABERNET's "Football" Conceptual Model.

Please select your Drivers & Pressures

Please choose the order and significance of your Drivers & Pressures. You may choose from the pre-defined lists below or choose your own.

Where: 1 = Most Significant & 7 = Least Significant

Add Your Own	Choose From List	You Have Selected
<input type="text"/>	Cultural Heritage ▼	Cultural Heritage
<input type="text"/>	Financial Viability ▼	Financial Viability •
<input type="text"/>	Risk & Liabilities ▼	Risk & Liabilities
<input type="text"/>	Professional Skills ▼	Professional Skills
<input type="text"/>	Community Needs ▼	Community Needs
<input type="text"/>	Technical Knowledge ▼	Technical Knowledge
<input type="text"/>	Spatial Planning Process ▼	Spatial Planning Process

Reset Add to list Kick the ball

Fig. 4.5 - Web-based interface of the CABERNET's "Football" Conceptual Model (CABERNET, 2006).

4.2. Identification of the main phases of the brownfield regeneration process and development of the first versions of the framework

The second step of the development process of the TIMBRE framework consists in the identification of the main phases of the brownfield regeneration process. Such phases are determined through the study of the previously selected frameworks. Their similarities and differences are analysed and, as a result, 13 phases able to represent all the fundamental steps of the brownfield regeneration process are identified. A first version of the TIMBRE framework, represented in Fig. 4.6, is then developed.

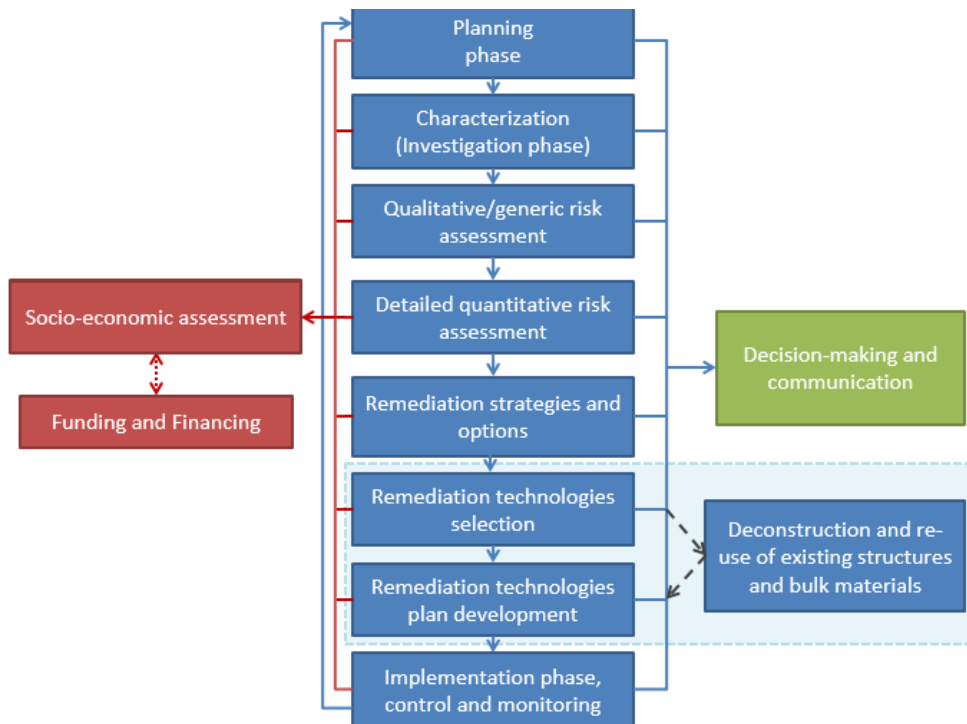


Fig. 4.6 - First version of the TIMBRE framework for the collection of available information on brownfield regeneration.

At this level, the framework can be defined as a conceptual scheme describing a decisional process made up of a sequence of different phases. The colours identify the various aspects of the process. Phases in blue identify the technical aspects of the regeneration process, while those in red and green identify respectively the socio-economic aspects and the processes of decision-making and communication. Socio-economic aspects and decision-making and communication processes are connected to all the other phases, in order to highlight the fact that such aspects must be considered throughout the whole process. An important feature that characterise the TIMBRE framework, and consequently the Expert System, is that end-users are able to select only the phases useful to their activities and objectives within the regeneration process. This aspect of the TIMBRE framework is maintained also in its following versions.

Already during this second step of the framework development process, a first stakeholder engagement process takes place. TIMBRE partners who collaborate in the project are asked to evaluate the TIMBRE framework and to provide suggestions in order to improve its effectiveness and correct possible faults. The first version of the framework is subjected to an initial analysis and evaluation by TIMBRE partners through project meetings. Such engagement process leads to a deep evolution of the TIMBRE framework, as shown in Fig. 4.7.

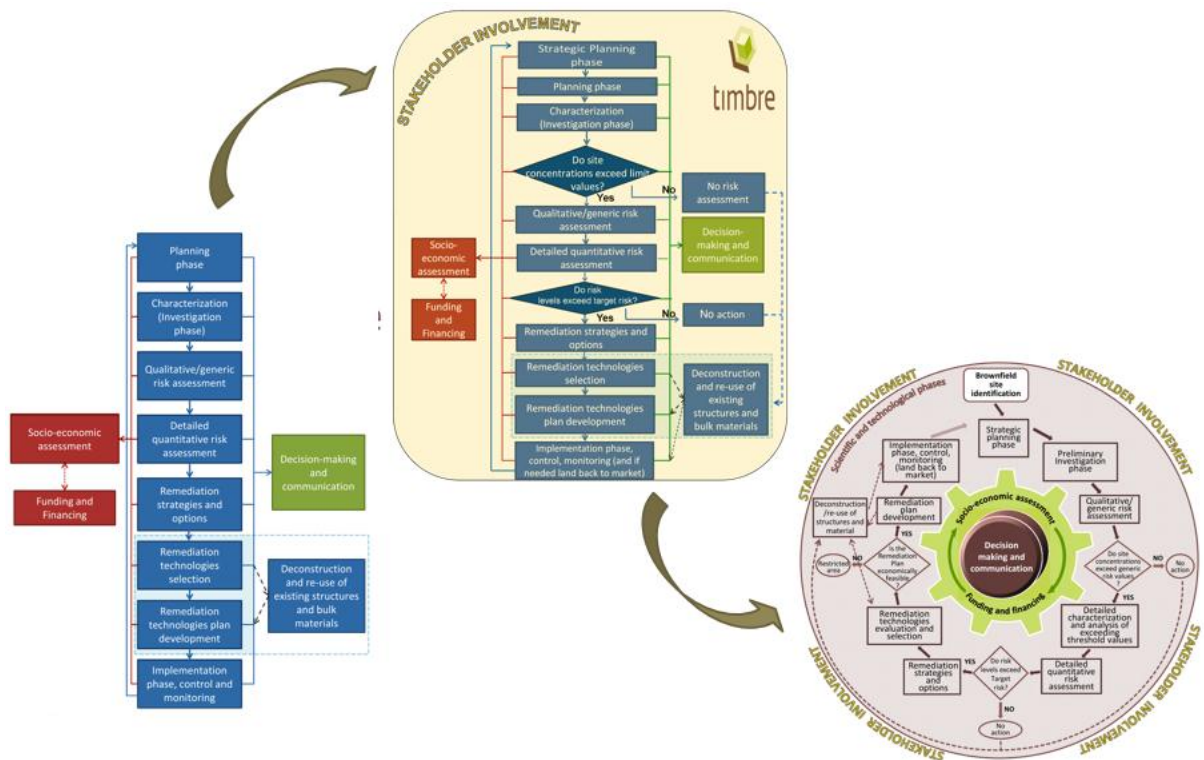


Fig. 4.7 - Evolution of the TIMBRE framework during the second step of its evolution. The changes are made thanks to the cooperation with TIMBRE partners.

The second version of the TIMBRE framework (Fig. 4.8) gains “decisional” features. End-users are able to operate choices during the regeneration process defined by them by selecting the desired phases indicated in the TIMBRE framework. Such changes arise from the necessity, indicated by TIMBRE partners, to represent all the scenarios that a brownfield regeneration process can present. The “interactive elements” that give to end-users the possibility to make choices are represented in the TIMBRE framework with diamond-shaped elements.

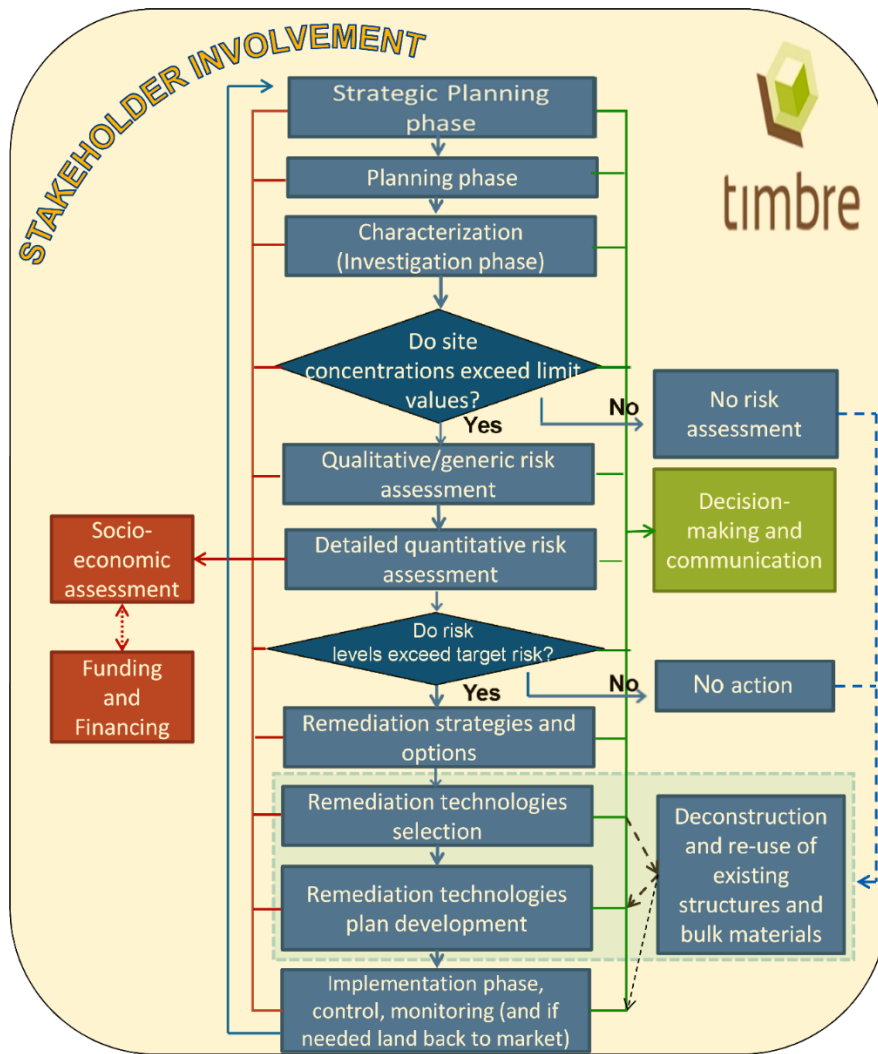


Fig. 4.8 - Second version of the TIMBRE framework for the collection of available information on brownfield regeneration.

The third version of the TIMBRE framework (Fig. 4.9) maintains the same functioning but changes its structure. TIMBRE partners highlighted the advantages of a circular representation of the brownfield regeneration process. This structure does not change the conceptual structure of the TIMBRE framework but it better shows the iterative aspect of the regeneration process.

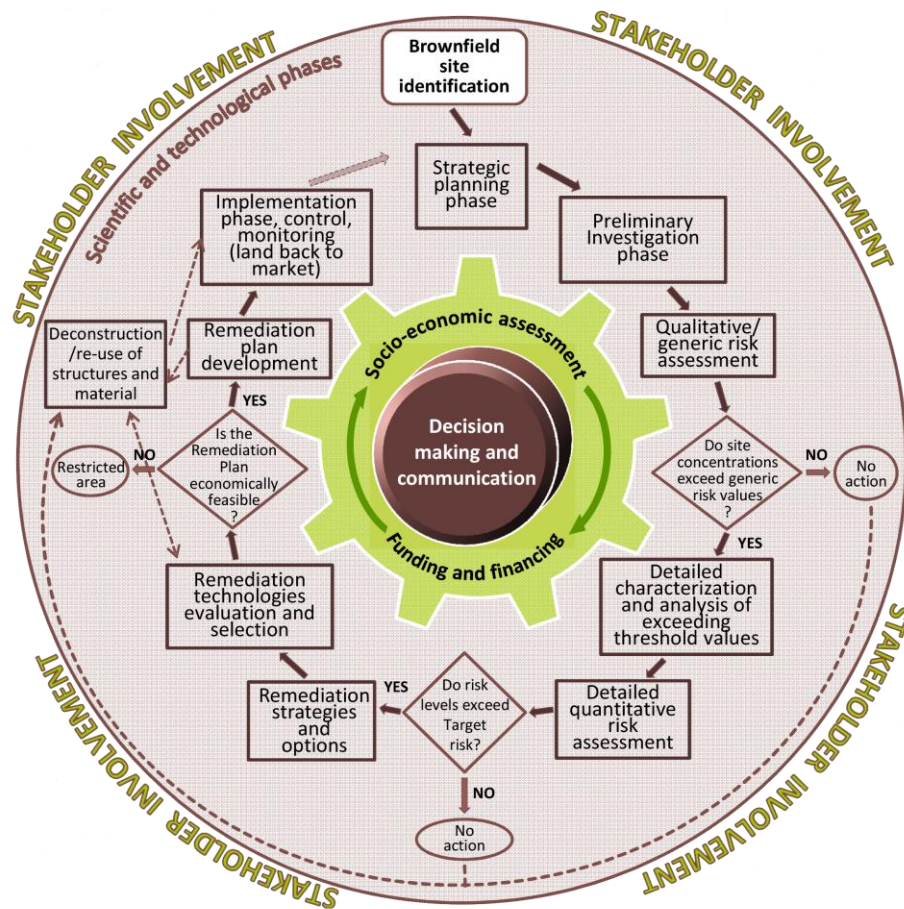


Fig. 4.9 - Third version of the TIMBRE framework for the collection of available information on brownfield regeneration.

4.3. Engagement of stakeholders in order to evaluate and further develop the TIMBRE framework

In the third step of the framework development process, stakeholders are involved in order to evaluate the timbre framework and provide useful feedback for the Expert System (see Chapter 1). To involve the stakeholders, an engagement process is developed. It is important to clarify that the 'engagement process' is an independent procedure that takes place within the 'TIMBRE framework development process'. In this paragraph, the stakeholder engagement process is briefly described while, due to its fundamental importance within this work thesis is thoroughly analysed in Chapter 5.

The objectives of the stakeholder engagement process are:

- to achieve a shared and agreed framework for the collection of available information on brownfield regeneration;
- to improve the framework by collecting stakeholders' feedback and by identifying possible gaps;
- to identify the phases that are more important, useful and critical for stakeholders; and
- to increase the credibility and legitimacy of the final result.

The stakeholder engagement process is made up of four phases:

- A. Planning: the stakeholder engagement process is defined in all its aspects (e.g. methods of engagement, number and typologies of stakeholders, methods for the collection and analysis of the data) (see Chapter 5.1);
- B. Stakeholders identification and selection: stakeholders within the TIMBRE project and "external" stakeholders (see Chapter 5.2) that meet the requisites identified in the Planning of the engagement process (Phase A);
- C. Workshops and focus groups: TIMBRE stakeholders were invited to a series of meeting in order to evaluate the TIMBRE framework. The third version of the framework (Fig. 4.9) was evaluated in the workshops and focus groups. Results are illustrated in Chapter 6.1 (see Chapter 5.3);
- D. Web-based questionnaire: "external" stakeholders and a number of the TIMBRE stakeholders were asked to respond to a web-based questionnaire in order to provide useful feedback for the improvement of the framework and the expert system (see Chapter 5.4). The fourth version of the TIMBRE framework was used in the questionnaire (see Chapter 6.1). Results of the questionnaire are illustrated in Chapter 6.2.

4.4. Collection, evaluation and implementation of feedback, suggestions, comments and opinions resulting from the engagement process of external stakeholders

The fourth step of the framework development process consists in the collection, evaluation and implementation of feedback, suggestions, comments and opinions resulting from the engagement process of external stakeholders. Data were collected and analysed after every step of the engagement process. The obtained data were both qualitative and quantitative.

Qualitative data resulting from meetings (workshops and focus group) were obtained from audio/video records realised during the events, transcribed into word processing software (Microsoft Word), translated in English by TIMBRE partners and then directly analysed.

Quantitative and qualitative data resulting from the web-based questionnaire were collected in an online server and then transferred in a database management system (Microsoft Access). Afterwards, quantitative data were analysed using descriptive statistics and visually represented through graphs and charts in order to summarise the answers of respondents on specific questions.

Qualitative data resulting from the web-based questionnaire were analysed in order to provide more in-depth information able to reflect a respondent's own thinking. Answers were carefully read, and recurring feedback and enlightening suggestions were reported in the qualitative evaluation of the results. It is important to define the level of the qualitative analysis. Boyatzis (1998) affirms indeed that qualitative analysis can be made at an explicit or an interpretative level. At an explicit level, the analysis is based on the explicit meaning of the data, without interpretations by the researcher. On the opposite, interpretative analysis requires a certain level of interpretation on the part of the analyst. In this work thesis the interpretative analysis is kept at a minimum level and considers only the written and explicit content.

4.5. Presentation of the final version of the framework and its integration in the web-based Expert System

The fifth, last phase of the framework development process (Fig. 4.1) consists in the presentation of its final version and of its integration in the web-based Expert System. The results of the development process and of the stakeholder engagement are presented to all the TIMBRE partners and there is the intention to present it to those stakeholders who participated in the engagement process and expressed the interest to go ahead with the collaboration.

5. The Stakeholder engagement methodology

The main objective of this work thesis is the creation of a methodology for the engagement of external selected stakeholders for the evaluation and further improvement of the TIMBRE framework in order to obtain a useful and shared scientific result. As said in chapter 4, this chapter provides a thorough description of the adopted stakeholder engagement methodology. The process was made of four phases as shown Fig. 5.1, indicating its schematic representation. Such procedure was ideally meant to be utilised for every case study of the project (Czech Republic, Germany, Italy, Poland and Romania) but, for organisational and temporal reasons, it has been applied only to some of them.



Fig. 5.1 - Schematic representation of the stakeholder engagement process for the evaluation and further improvement of the TIMBRE framework.

5.1. Planning

Before the beginning of the engagement process, an early planning activity took place in order to clarify the following aspects:

- identification of categories of stakeholders to be involved in the engagement process;
- identification of the resources required for the engagement of stakeholders, especially in the order of time length and establishment of the needs and capacities of stakeholders;
- definition of the strategic reasons and purposes for beginning the engagement process;
- identification of the potential problems that may occur during the engagement process (e.g., translation problems, impossibility to perform all the steps in every case study, necessity of a facilitator);
- identification of responsibilities during the different steps of the engagement process;
- engagement level needed in order to obtain the defined objectives;

- identification of the most effective techniques and method of involvement once defined the previous points.

It was decided to lead a series of early involvement meetings with a number of TIMBRE stakeholders (see Paragraph 5.2 to know the different groups of involved stakeholders) in order to better plan and define the engagement process. For organisational reasons, it was possible to organise only the meeting, in the form of a workshop, for the Romanian case study. The workshops took place in Hunedoara the 11-12th October 2011. For this meeting, TIMBRE partners from Romania chose a definite number of stakeholders with expertise in the field of brownfield regeneration. Stakeholders were asked to answer a number of questions useful to discuss the aforementioned points. Stakeholders were involved in a discussion group that helped to answer the following questions:

- How would you rate your interest to actively take part in a participatory process?
- Have you ever taken part in a participatory process? If yes, what is your opinion about it?
- Are there any sorts of problems, difficulties, or particular reasons that keep you away from taking part in the engagement process?
- How much time and resources would you dedicate to the engagement process?
- Who should be deemed to take part in this specific engagement process?

Moreover, it was useful for the instauration of good connections with the stakeholders for the continuation of the relationship during the whole project. The planning phase and the workshop with stakeholders helped to better define the rest of the engagement process. It was confirmed indeed the initial idea of performing the stakeholder engagement process in two steps: first, a series of workshops and focus groups and, afterwards, an online questionnaire. It was also decided that only experts in the field of brownfield regeneration would have been involved. The objective of the engagement process required indeed a deep knowledge of brownfield regeneration processes. The involvement of lay people would have made the engagement process less effective and therefore it has been decided to not involve them.

5.2. Identification of stakeholder categories and their individual members

As mentioned In Chapter 1, stakeholders were selected from five different countries that participate in the TIMBRE project, namely Czech Republic, Germany, Italy, Poland and Romania. For this work, two macro-groups of expert stakeholders have been involved. The first group consist in those stakeholders that have been identified as useful for the case studies of project TIMBRE, and that can be considered as strictly connected to the whole project. The other group is composed of stakeholders not directly connected with the TIMBRE project but with affinities with the brownfield regeneration context. It has been decided to engage this second group in order to receive feedback from a wider group of expert stakeholders, especially for what concerns the questionnaire (see Paragraph 5.4).

Stakeholders for TIMBRE case studies have been identified through a strong collaboration between different Work Packages of the TIMBRE project. In order to identify stakeholders for the three cases of studies concerning WP1 (Czech Republic, Poland and Romania) interviews and focus groups have been held. The adopted approach to the identification of key stakeholders (Alexandrescu, 2012) takes its roots from the classification of stakeholders (reported in Table 5.1) suggested by the International Advisory Board (IAB) of the TIMBRE project. Such classification distinguishes eighteen categories of stakeholders that can be involved in the brownfield regeneration process. For WP1 purposes, seventeen categories have been taken into account, excluding site occupiers since they were not involved in the research objectives. Stakeholder categories can be subdivided in turn into two groups. The first group include those categories that hold stakes around a specific brownfield site (landowners, site neighbours, site occupiers, local community groups, etc.), while the second group those that are not necessarily linked to any specific site, even though they can play a significant involvement in the regeneration of brownfields (regional and sub-regional governments, regional and national regulators, developers and investors, technology providers, consultant, financiers, etc.). Based on this classification of actors, TIMBRE partners have distinguished and selected the categories and nominatives of the most suitable stakeholders for the TIMBRE objectives.

Table 5.1 - Adaptation of the classification of stakeholder categories according to the TIMBRE International Advisory Board (Alexandrescu, 2012).

Stakeholder group	Sub-group
Site owners	Landowner/Problem owner, Subsidiary interest group
Site neighbours	Immediate (< 1km), further afield
Local authorities (town or city)	Urban planning, Environmental health, Soil/Groundwater protection, Municipalities
Region and sub-regional government	Spatial planning
Regional and national regulators	Soil/Groundwater protection, Waste, Environment, Occupational Health and safety, Preservation order, Regional Development
Local community groups (neighbourhood, districts)	Residents and business users, Gender, ethnicity, cultural differences
Public interest groups	Environmental groups, NGOs, Grassroots movement
Developer/investors	Risk transfer, Market forces, Profitability and economic feasibility, Re-use planners
Technology providers	Warranties/professional indemnities, Innovation seekers
Consultants	Designers, Environmental experts, Ecologists, Town planners, Marketing agents,
Financiers	Public, Private
Contractors	Remediation, Infrastructure, Construction, Landscaping, Worker's health & safety
Insurers	Risk transfer, Carrier of on-going risk, Carrier of residual risk
End-users	Occupier, Residential, Business, Leisure, Casual visitors
Media	Press (TV and Radio), Web, Other
Scientific community and research	Students, Natural science researchers, Social science researchers, Engineering science researchers, Other
Other	

For the purpose of this work thesis, also stakeholders not directly related with the TIMBRE case studies have been engaged. This in particular refers to the last step of the engagement phase here described, namely the administration of a web-based questionnaire. A number of additional stakeholders have been contacted to participate to the questionnaire in order to increase the

number of response and permit a statistical analysis of the set of resulting data. Two main criteria were deemed as fundamental for an effective selection of these stakeholders:

- expertise in their field: it was agreed that knowledge and experience in the brownfield regeneration process were fundamental for the effectiveness of the engagement process;
- propensity to participate: another fundamental aspect to consider was the willingness to participate in the engagement process. Expert actors not interested in participating would have not contributed to the evaluation of the framework.

Stakeholders were contacted through different modalities for participating to the meetings and the questionnaire. Such modalities are explained in the respective paragraphs.

5.3. Workshops and Focus groups

Workshops and focus groups were the first real engagement steps realised with the aim of evaluate and improve the TIMBRE framework. It was possible to lead the meetings for two case studies. Three meetings took place: a focus group in Romania and two workshops in Czech Republic.

The objectives of the workshops and focus groups were the followings:

- get a first acquaintance with the local stakeholders in order to establish a good relationship for the continuation of the project;
- presentation of the TIMBRE framework in order to start an open discussion with local stakeholders and collect their opinions, comments and suggestions to improve its consistency, completeness and effectiveness;
- introduction to the web-based questionnaire with the explanation of its questions, functioning and purposes.

In order to avoid losing informative content, it was decided to run workshops and focus groups in the respective languages of origin. For this reason, a facilitator speaking the language of origin was needed. Stakeholders were selected by TIMBRE partners of the respective countries by

taking in consideration the criteria mentioned in paragraph 4.2. They were contacted through a formal written invitation.

Before beginning of the meeting, it was necessary to explain to the facilitator the functioning and objectives of the framework and what it was expected from the engagement process. This was done in order to put the facilitator in the right conditions to lead the meetings.

The meetings were one to two hours long and they were structured in two parts. In the first part, the facilitator and the researchers introduced the TIMBRE framework, describing its functioning and its objectives. In the second part of the meetings, stakeholders were asked to provide opinions, comments and suggestions about the TIMBRE framework. In order to do this, stakeholders were divided into smaller groups and for each group a poster with the scheme of the TIMBRE framework was provided. Stakeholders were asked to discuss together the framework and to draw or write their feedback, opinions, comments and suggestions on the poster. At the end of the meetings, the posters were collected and, where possible, the discussions between stakeholders, with their consent, were recorded, transcribed and translated for a later analysis.

5.4. Web-based questionnaire

The last step of the engagement process consisted in the administration of a web-based questionnaire. In this step all stakeholders related to the TIMBRE project and another groups of “external” stakeholders (Paragraph 5.2), belonging to the countries of the five case studies (Czech Republic, Germany, Italy, Poland, Romania), were contacted. Stakeholders were selected by the TIMBRE partners of their respective countries. It was considered necessary to contact a number of at least 30 stakeholders for every country, for a total of 150 stakeholders, in order to obtain a sufficient number of responses. As shown in the results (Chapter 6), a higher number of stakeholders was contacted, unequally divided for the five case studies.

The questionnaire was provided to the stakeholders in their native languages. Therefore, before its administration, it had to be translated by TIMBRE partners. In this way also those who cannot speak English could fill in the questionnaire correctly and more exhaustively, without

misunderstanding the meaning of the questions. As a result, the chances of receiving more filled questionnaires back increased. The objectives of the questionnaire are listed here below:

- to achieve a shared and agreed version of the framework for the collection of available information on brownfield regeneration;
- to improve the framework by collecting stakeholders' opinions and suggestions and by identifying possible gaps;
- to identify the categories of information (Chapter 4.3) that are more important, useful and critical for stakeholders;
- to increase the credibility and legitimacy of the final result.

5.4.1 Pilot test of the questionnaire

Once the questionnaire had been developed, it was subjected to a pilot test. It was sent out to a limited number of stakeholders of the Romanian case study in order to find last minute errors or to identify possible misunderstandings and doubts of the respondents (e.g., question wording that respondents do not understand, questions that do not follow a logical sequence, overlapping questions).

5.4.2 Questionnaire administration

The questionnaire was sent to stakeholders through e-mail. The e-mail contained a message describing the TIMBRE project and its objectives, the functioning and purposes of the Expert System and the TIMBRE framework, and the aims of the questionnaire. It was also explained how to access and fill in the questionnaire and its deadline. It was then provided the internet link to the questionnaire webpage. In case of technical problems (e.g., inability to access the site during working hours), it was attached to the e-mail a printable version of the questionnaire. The online format was chosen because it can be filled directly in a webpage without the need to print it or send it back by e-mail. The data were automatically saved in a database avoiding the need to transcribe them in a comprehensible and analysable format.

5.4.3 Structure of the questionnaire

The online questionnaire was structured in four parts, corresponding to four internet pages. The first page contained an introduction with the description of the framework and all its categories of information. It was then followed by the three sections containing eight questions:

- Part 1 - Profile of the respondent: in the first part of the questionnaire, information on the respondent were asked. Such information was fundamental to understand and associate to specific categories of stakeholders the information provided in Part 2 and 3 of the questionnaire. It was also useful to understand the importance and experience of the respondents within the field of brownfield regeneration;
- Part 2 – Brownfield perception: this part of the questionnaire was useful to understand the perception of every respondent about the presence and regeneration of a brownfield. Knowing how they define and they perceive a brownfield is of fundamental importance to understand how they could potentially use the Expert System and what information they could look for;
- Part 3 – TIMBRE framework evaluation and opinions on the Expert System: in the last part of the questionnaire, stakeholders were asked to evaluate and provide comments and suggestions to the structure of the TIMBRE framework. They were also asked to provide feedback on the usefulness of the Expert System and motivations regarding its utilisation or not.

In Annex II the full questionnaire is reported, both in English and Italian.

PART C – APPLICATION TO CASE STUDIES

6. Results from case studies

This chapter presents the results of the application of the engagement process that has seen involved the stakeholders of TIMBRE project and other “external stakeholders” of five case studies (see Chapter 1.1 and 5.2). The selected stakeholders were involved through two different methods of engagement. Initially, TIMBRE stakeholders participated in a series of meetings in the forms of workshops and focus groups, where they obtained information on the structure, functioning and purposes of the TIMBRE framework. In addition, they were asked to comment, provide feedback and pinpoint potential faults of the framework itself. Successively, as a last step, some of the TIMBRE stakeholders and other “external” stakeholders were asked to respond to an online questionnaire in order to provide useful information both for the TIMBRE framework and the consequent web-based Expert System. Questions within the questionnaire permitted stakeholders to evaluate the TIMBRE framework more minutely.

The selected stakeholders are divided in five case studies, corresponding to as many countries participating in the TIMBRE project: Czech Republic, Germany, Italy, Poland and Romania. Where it is not possible to point out differences between the case studies, results are analysed as a whole. However, differences, when evident, are highlighted during the analysis of the results.

The following paragraphs illustrate the results of both meetings (Paragraph 6.1) and the online questionnaire (Paragraph 6.2).

6.1. Workshops and focus groups results

Because of organisational reasons, it was possible to conduct the workshops and focus groups only for the Romanian and Polish case studies. TIMBRE partners of the respective countries selected the nominatives of the stakeholders and invited them to participate. More precisely, the Romanian stakeholders participated in one workshop (Hunedoara, 11-12th October 2011) and in one focus group (Bucharest, 31st January 2012), while Polish stakeholders participated in two workshops (Zielona Góra and Szprotawa, 28th and 29th March 2012). It is important to highlight the fact that, for both case studies, the groups of participants changed in the two meetings. A number of stakeholders participated in only one of them, while others participated in both.

The results of the meetings were obtained through the analysis of audio/video records and of their transcriptions. As an example of the work that has been done, an excerpt of the transcription of the focus group that was held in Bucharest the 31st of January 2012 is here reported. The transcription is based on the audio recording of the focus group's discussion. Here below is indicated the meaning of the symbols which are used in the transcript:

- the facilitator of the discussion is indicated with the letter "F";
- the different stakeholders are indicated with the acronym "Stk" and are differentiated through capital letters (e.g., StkA, StkB, StkC);
- question marks in square brackets [?] indicate that the identity of the speaker is uncertain;
- text between square brackets [] includes additions by the facilitator, which are meant to make more explicit what the speaker wanted to say;
- text between double parentheses (()) contains a section of speech that is difficult to understand. If it is not possible to make out what the speaker is saying, empty double parentheses are used;
- the symbol [...] indicates that a part of the transcription has been cut.

Table 6.1 - Excerpt from the transcript of the focus group held in Bucharest the 31st of January 2012.

BEGINNING OF THE EXCERPT

F: [...] We have three colours for the observations, red, green and black. Please indicate what other steps [are needed] or what preconditions have to be met or what [preliminary] steps have to be made to reach a certain step [from the framework].

[?]: One needs to know even at the investigation stage [what will be the final use]

StkA: Not so much the investigation as the remediation. The remediation brings one to the level of future use. Therefore, the remediation depends on the future use of the land. The initial plan or strategy will obviously be turned on its head while moving through the different steps. One will reach the conclusion that things are much different from what you thought (in the beginning).

StkB: From the first step one should know what target has to be reached, to know all factors, what concentrations ... what are the limits, how far should one go. In short, you need to know what target needs to be reached and what will be the future use of the area.

StkA: Nowhere does one qualitative and quantitative assessment, one after the other. It makes no sense. You either do one or the other. Each of these assessments identifies a certain thing. The qualitative assessment can only let one know that additional investigations are needed. The qualitative assessment does not inform one if remediation actions are needed [...]. That is why, in general, the qualitative assessment stage is part of the preliminary investigation. And this generic or qualitative assessment will inform you if detailed investigations are needed [...].

F: So, in the end, the qualitative and generic risk assessment has its specific role, is that right?

StkA: Yes, it does. But between the qualitative and quantitative risk assessment there needs to be this [detailed investigation]. There are three steps in evaluating risks: the West European philosophy is that investigations should not be carried out only for the sake of investigation. The aim of investigations is to furnish the needed elements for the risk assessment study [...]

StkC: I have a suggestion which, I think, might help. Before the selection of technologies or during that selection, I would include the feasibility of remediation solutions. In any project, there is a feasibility stage of defining the remediation potential [...]

StkA: [...] Here I agree with StkC, this feasibility study should include the whole selection and cost-benefit analysis, everything. These should be carried out in a professional manner [...]. In every case, if I have not reached the targets of the remediation, in the case of a contaminated site, if there are excessive costs, we need to stop and impose limitations [in the use of these sites] [...].

StkD: Here I would like to add that once one begins to analyse if the concentrations exceed threshold values, I am already doing risk analysis. These threshold values correspond to an acceptable level of risk. These values are placed there according to some...

StkA [interrupting]: if you noticed, each investigation stage is completed with a risk assessment study.

StkD: Exactly.

[...]

F: StkE, do you have any suggestion?

StkE: No, but StkA raised a very interesting issue with regard to the quantification of risk: what does it cost if you do not take any action? Or if you take action step by step, it is very difficult to draft this assessment.

F: And where would that fit [in the framework] ?

StkE: I am not sure. However, in the strategic planning phase, you need to know what will be going on that site.

END OF THE EXCERPT

The transcripts of the discussions were utilised to extract the information useful for the improvement of the TIMBRE framework.

The conclusions from the workshops and the focus groups are here presented:

- an overall preference toward the cyclic version of the TIMBRE framework was found. It had basically the same structure and functioning of the first, linear version, but it better visually described the process and it pointed out the potentially unfinished character of the regeneration process;
- it has been noticed that, during the discussion, stakeholders were more concerned about the decisional process (order and connection between the phases) described by the TIMBRE framework, than the content and correct subdivision of its different phases. In other words, stakeholders were more focused on the brownfield regeneration process than on the structure of, and subdivision within, the TIMBRE framework;
- the point mentioned above has been strengthened by the fact that the decisional process represented in the TIMBRE framework was potentially not able to represent all the scenarios that a brownfield regeneration process could present. It was particularly noticed the lack of trade-offs, mishaps, potential failures and non-ideal developments that can occur during the brownfield regeneration process.

The outcomes of the meetings have resulted in changes in the structure and content of the TIMBRE framework. In particular, the fourth version of the framework lost its decisional aspects. In fact, the arrows connecting the different categories of information and the interactive phases (identified by the diamond-shaped elements in the third version of the framework, Fig. 4.9) were removed, thus putting more emphasis on the framework's task of serving as a conceptual structure for the collection and categorisation of available information on the brownfield

regeneration process. The circular structure of the previous versions of the framework was maintained, designing it with the shape of a compact disc (CD), in order to give the idea of a tool with the objective of storing data. The “phases” of the TIMBRE framework changed their denomination in “categories of information” (see Annex I for the description of the information categories) in order to avoid misconceptions. Even their content was reviewed and validated among TIMBRE partners after having analysed the outcomes of the meetings.

The fourth version of the framework, resulting from the collaboration with TIMBRE stakeholders in the workshops and focus groups, is presented in Fig. 6.1.

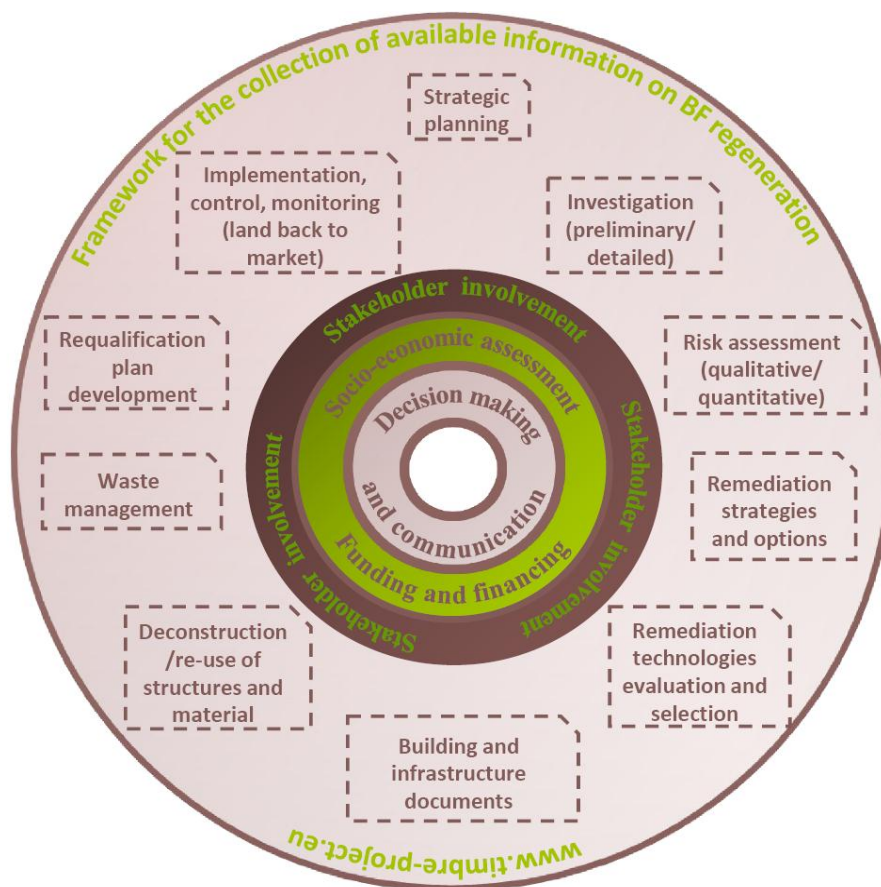


Fig. 6.1 - Fourth version of the TIMBRE framework for the collection of available information on brownfield regeneration.

6.2. Online questionnaire results

The questionnaire consisted in the last phase of the stakeholder engagement process. In this chapter the results obtained through this research instrument are presented through charts and

tables. The questionnaire was made up of an introduction, a descriptive form asking for stakeholder information, and of eight questions subdivided in two parts, namely 'Brownfield perception' and 'Framework evaluation and opinions on the Expert System'. Stakeholders were asked to provide feedback and evaluate the fourth version of the TIMBRE framework (Fig. 6.1).

A total of 55 questionnaires, out of 182 (30,2%) sent, were returned. A different number of stakeholders were contacted in the five countries. Since the questionnaire was completed by a limited number of stakeholders, it was not always possible to analyse the five case studies separately. The number of sent questionnaires and received responses for every country is reported in Table 6.2.

Table 6.2 - Number of sent and received questionnaires for each country involved in the work thesis.

Country	Sent	Received	Answer rate (%)
Czech Republic	28	9	32,1%
Germany	23	12	52,2%
Italy	45	10	22,2%
Poland	39	7	18%
Romania	47	17	36,2%
TOTAL	182	55	30,2%

An answer rate of the questionnaire equal to 30,2% is in accordance with the average response rate of online questionnaires, which is around 30% (Hamilton, 2003). The rate fluctuates from the highest percentage (52,2%) obtained by Germany, to the lowest percentage (18%) obtained by Poland. It is important to highlight the fact that in the Polish case study, stakeholders belonging to public organisations were not allowed to access to external websites during their work time: this might have affected the answer rate of the group.

In Fig. 6.2, the pie chart indicating the subdivision of the total number of returned questionnaires among the 5 participating countries is shown.

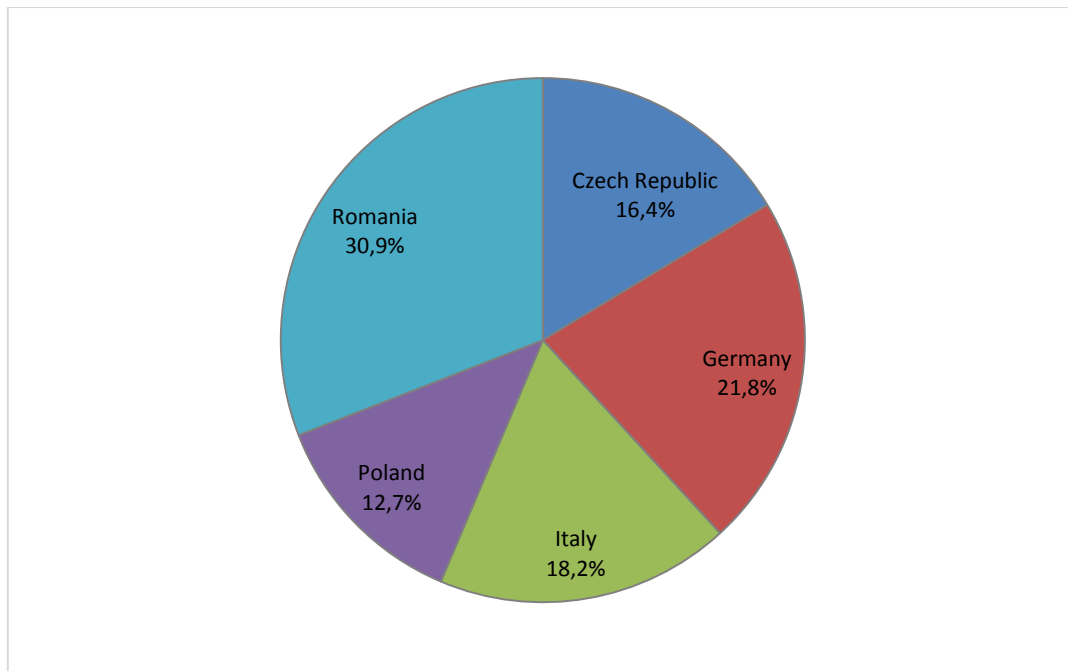


Fig. 6.2 - Pie chart indicating the subdivision of the total number of returned questionnaires between the 5 participating countries (100% = 55 returned questionnaires).

The results of the questionnaire are here presented in three sections, corresponding to those of the questionnaire: stakeholder information, brownfield perception and evaluation of the framework. The questions are listed by indicating the section of the questionnaire they belong to (P1, P2, P3) and their number within that section (Q1, Q2, Q3, ...).

6.2.1 Stakeholder information (profile of the respondents)

The first part of the questionnaire was meant to collect information on the participating stakeholders. Such information is of fundamental importance for the other two parts of the questionnaire and it is also important in order to examine which typologies of stakeholders participated in this phase of the engagement process.

P1-Q1_Please select here the type of organisation you represent (only one answer is possible).

As shown in Fig. 6.3, roughly the 70% of the respondents indicated themselves as member of a public organisation. Only one respondent checked the answer “Other” and indicated to be

member of a “Limited company held by the state”. The wide difference between “Public” respondents (69%) and the others (30,91%) can be explained by the fact that TIMBRE partners of respective countries mostly contacted public institutions during the selection of the nominatives of the stakeholders to involve.

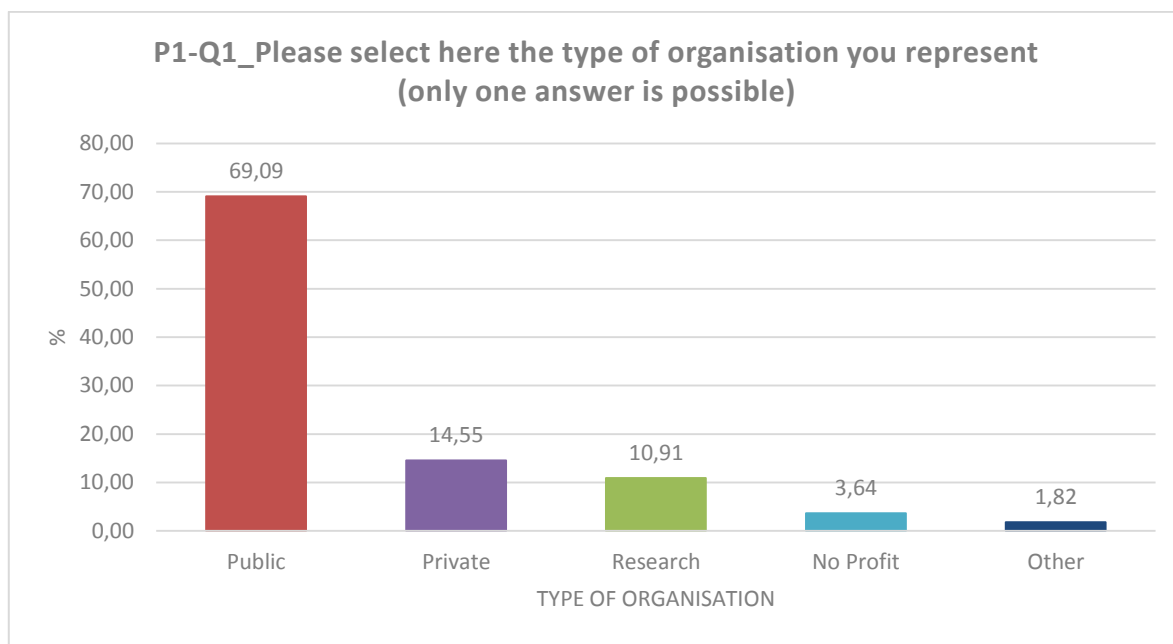


Fig. 6.3 - Clustered column chart representing the type of organisation indicated by the respondents.

The profiles of the countries can be studied in Fig. 6.4., where it is possible to observe that there are significant differences among the five countries. Only Poland is characterised by all the four standard choices (Public, Private, Research, No Profit). On the contrary, Romania is characterised only by respondents belonging to public organisations.

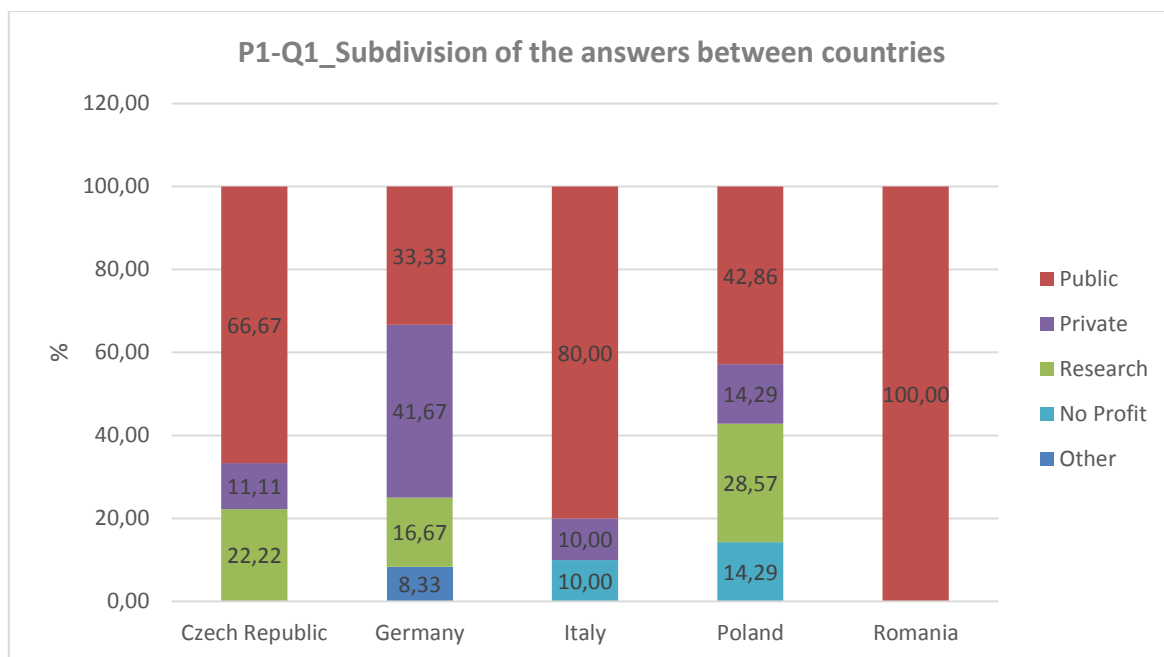


Fig. 6.4 - Stacked column chart describing the profile of the type of organisations of respondents in the 5 countries.

P1-Q2_Please indicate in which stakeholder category/categories you are included (more than one answer is possible).

In this question, stakeholders were asked to indicate in which stakeholder categories they would assign themselves. It was possible to provide more than one answer, therefore, the percentages indicated in Fig. 6.5 are in relation with the total number of selections provided by the respondents. There was a total of 87 selections out of 55 respondents and this means that a good number of stakeholders identify themselves in more than one category. By analysing this data, it is possible to find out that:

- in Czech Republic, stakeholders identify themselves in an average of 2,0 categories;
- in Germany, stakeholders identify themselves in an average of 1,6 categories;
- in Italy stakeholders identify themselves in an average of 1,3 categories;
- in Poland stakeholders identify themselves in an average of 2,43 categories; and
- in Romania stakeholders identify themselves in an average of 1,18 categories.

All categories of stakeholders, except the “Insurers”, have obtained at least one selection. As a result, it was possible to collect information from almost all the relevant categories of stakeholders needed for the objectives of this work thesis. Finally, three respondents out of six

that selected the field “Others” did not identify themselves in any of the proposed category, but proposed the following categories:

- university teacher;
- civil servant of public institutions;
- regulating authority at a county¹² level;
- controller;
- promoter of business and economic development.

The information provided in this field, results of great importance for the further improvement of the web-based Expert System (mentioned and briefly described in Chapter 1).

A high number of suggestions asking the addition of a specific category might indicate the absence of an important choice in which a relevant number of stakeholders identify themselves.

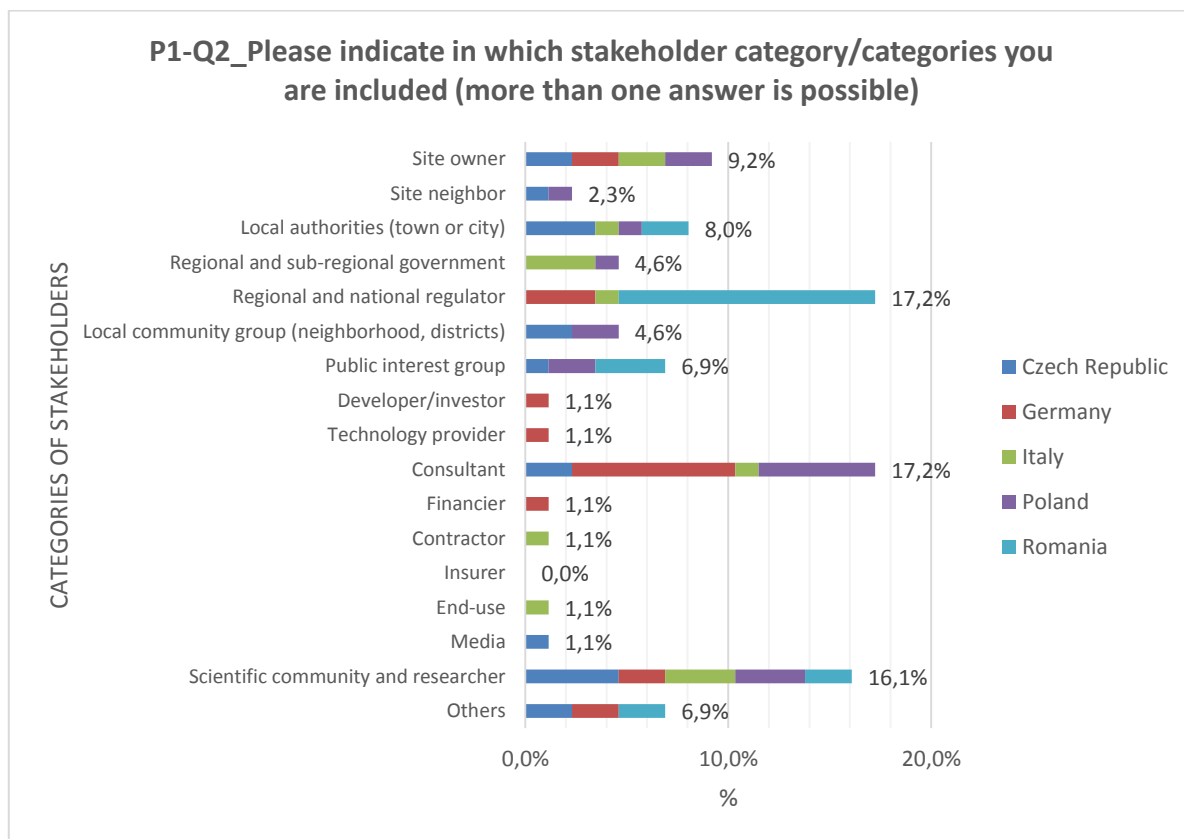


Fig. 6.5 - Stacked bar graph representing the distribution of answers, within the indicated stakeholder categories, given by respondents from the five different countries (each colour represents a country). The percentage number on the right of the bars represents the total percentage of the respective bar.

¹² The term “county”, in Romania, is referred to indicate the jurisdictions (județe) of the country and the municipality of Bucharest. Counties represent the NUTS-3 (Nomenclature of Territorial Units for Statistics – Level 3) statistical subdivision within the European Union.

P1-Q3a_In which area of expertise would you classify your work activity? (more than one answer is possible).

Question P1-Q3 was subdivided in two parts. The first part (P1-Q3a) asked respondents to indicate in which area of expertise they would classify themselves. It was possible to provide more than one answer, therefore, the percentages indicated in Fig. 6.6 are in relation with the total number of selections provided by the respondents. It is possible to observe that all the suggested areas of expertise have been selected (i.e. at least one expert per area of expertise has completed the questionnaire). Four more areas have been indicated in the field “Others”:

- management of industrial areas;
- education;
- media coverage;
- project development, innovation.

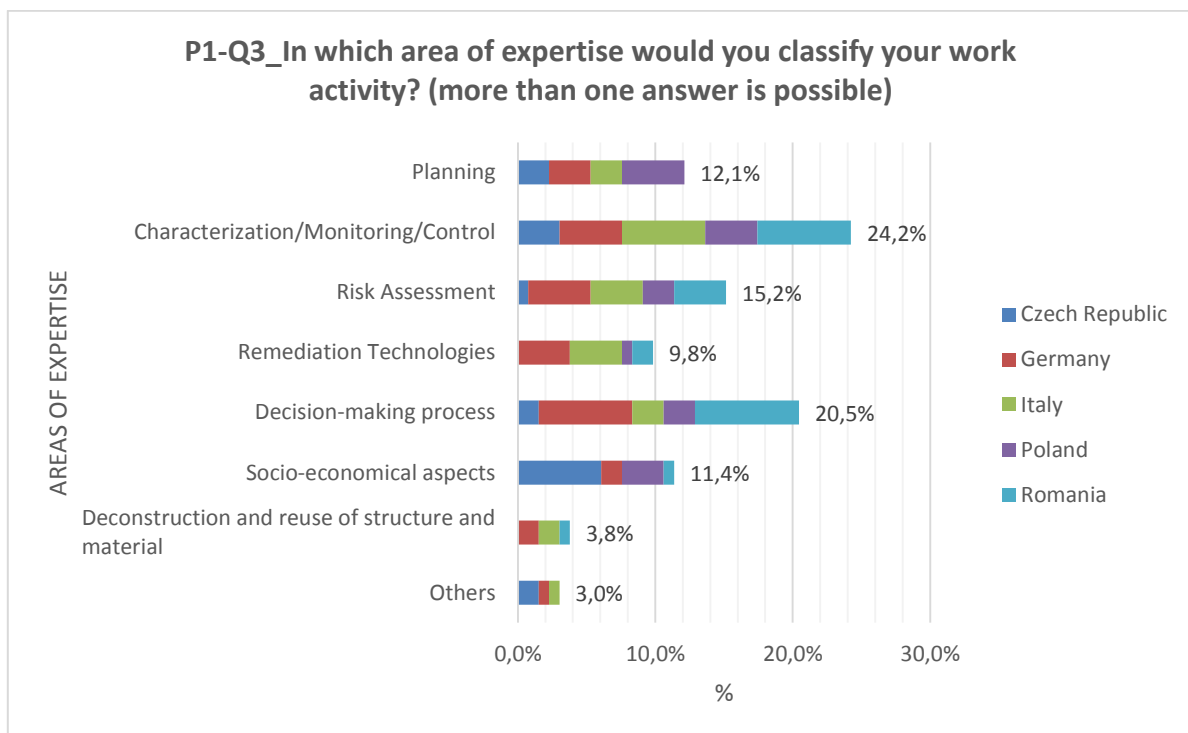


Fig. 6.6 - Stacked bar graph representing the distribution of answers, within the indicated areas of expertise, given by respondents from the five different countries (each colour represents a country). The percentage number on the right of the bars represents the total percentage of the respective bar.

P1-Q3b_Please provide a brief description of your work in the field of brownfield regeneration including which is the main aim of your work. If at the moment you are not working on brownfield regeneration, please provide your past experiences in this field.

This part of the question (P1-Q3b) asked respondents to provide a brief description of their work activity, past or present, related to brownfield regeneration. It served as a complement for the first part of the questions, in order to analyse more specifically the different activities related to brownfield regeneration in which stakeholders identified themselves. 54 out of 55 respondents provided an answer so it was possible to analyse the whole group of stakeholders. Looking at the answers, the heterogeneity of respondents has been confirmed. Analysing the single descriptions of activities it has been possible to group them in different sets according to their similarity. The activity of respondents can be summarised in the following categories:

- potential regeneration and re-use of brownfields, improvement of the space efficiency, determination of redevelopment scenarios and their possibilities and limitations;
- urban and spatial planning, regional planning, and landscape engineering;
- reclamation and remediation of brownfields, remediation technologies and methodologies, and identification of remediation objectives;
- finding of investors and investments, monetary risk-taking assessment, monetary estimate of contamination, and local economic development;
- development and execution of characterisation (soil, sub-soil, groundwater, sediments) and investigation plans;
- risk analysis and adoption of defensive measures;
- monitoring of the remediation and regeneration processes;
- disposal of waste (e.g., industrial waste, chemical waste) and rock excavation;
- decision-making within the brownfield regeneration process, involvement of stakeholders, sociological research on the brownfield topics, and communicative planning;
- brownfield inventories;
- media coverage on brownfield case of studies.

P1-Q4_Could you indicate other stakeholders connected to or influenced by your activities within the brownfield regeneration process? Please select the stakeholders from the attached list.

Question P1-Q4 wanted to highlight the network of stakeholders represented by the respondents and to point out the strongest connections between different categories of stakeholders. Due to the different number of respondents within each stakeholder category, the result might not represent the real situation in its entirety. In fact, some categories of stakeholders are represented just by one respondent and, therefore, that category is characterised just by “weak” or “absent” connections. The “Consultant” category has numerous strong connections with several other categories of stakeholders. Moreover, it is possible to observe that all categories of stakeholders have at least one connection with a different category (with exception of the “Insurer” category that was not selected by any respondent). This result suggests the presence of a complex network of interactions in the brownfield regeneration process and it could be a factor to be taken into account for the continuation of the improvement of the Expert System’s effectiveness. Table 6.3 shows all the connection between stakeholders.

Table 6.3 - Table showing the connections between the different categories of stakeholder. The first column indicates the categories of stakeholders that could be selected by respondents. The second column represents the number of respondents that indicated themselves as belonging to that specific category of information. The first row indicates the categories of stakeholders to which respondents are connected. The boxes have different colours, depending on the number of connections. White: no connections; Orange: 1 to 3 connections; Red: 4 to 6 connections; Light green: 7 to 9 connections; Green: 10 to 12 connections.

		C - Site owners	C - Site neighbours	C - Local authorities (town or city)	C - Region and sub-regional government	C - Regional and national regulators	C - Local community groups (neighbourhood, districts)	C - Public interest groups	C - Developer/investors	C - Technology providers	C - Consultants	C - Financiers	C - Contractors	C - Insurers	C - End-user	C - Media	C - Scientific community and researchers
Site owner	8	6	4	6	7	6	4	1	8	4	6	2	6	0	6	1	4
Site neighbour	2	2	2	1	1	1	2	0	2	1	1	1	1	0	1	0	1
Local authorities (town or city)	7	7	4	4	5	3	5	0	5	1	2	1	1	0	1	0	1
Region and sub-regional government	4	4	1	3	3	2	0	0	3	1	3	1	3	1	2	0	1
Regional and national regulator	15	11	3	10	8	9	2	6	8	6	8	3	4	0	4	5	5
Local community group (neighbourhood, districts)	4	3	1	3	1	1	4	2	2	1	1	1	1	1	1	1	4
Public interest group	6	3	1	4	3	2	3	4	1	1	2	1	1	1	1	1	3
Developer/investor	1	1	1	1	1	1	0	0	1	1	1	0	0	0	1	1	1
Technology provider	1	1	1	1	1	1	0	0	1	1	1	0	0	0	1	1	1
Consultant	15	10	5	11	10	8	5	2	9	5	9	4	7	2	9	3	9
Financier	1	1	1	1	1	1	0	0	1	1	1	0	0	0	1	1	1
Contractor	1	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0
Insurer	0	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0
End-use	1	0	0	1	1	1	0	0	0	0	1	0	0	0	1	0	1
Media	1	0	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0
Scientific community and researcher	14	6	0	12	8	7	5	4	2	3	4	0	1	0	3	1	12
Other	6	2	2	1	1	1	2	0	2	1	1	1	1	0	1	0	1

6.2.2 Brownfield perception

P2-Q1_According to your work experiences and activities, could you provide us your own description of a brownfield site?

The first question of the second part of the questionnaire, concerning the perceptions of brownfields and their management, asked respondents to provide a definition of brownfields. Purpose of the question was to find out the perception of brownfield between stakeholders of the different participating countries. The definition provided by the respondents were compared with the CABERNET (2006) definition, which currently is the most widely used in the European area:

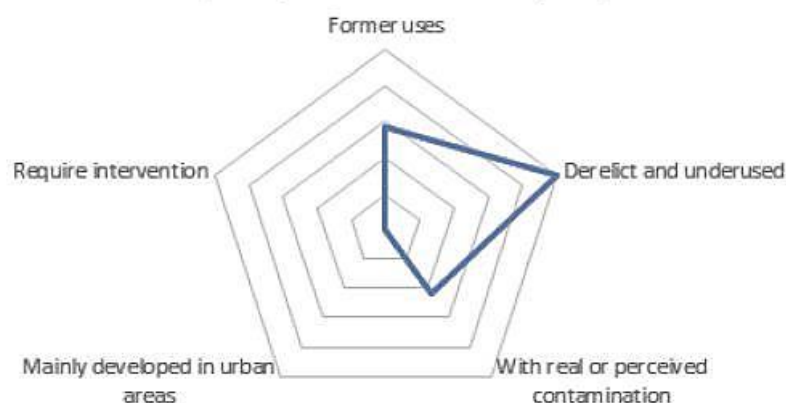
“Brownfields are site which: have been affected by former uses of the site or surrounding land; are derelict or underused; are mainly in fully or partly developed in urban areas; require intervention to bring them back to beneficial use; and may have real or perceived contamination problems.”

The comparison with the CABERNET definition has shown differences between the perceptions of a brownfield within the five countries. The analysis has been conducted as follow: five main topics have been identified within the CABERNET definition and the definitions provided by respondents have been analysed by checking how many of these topics have been explicitly mentioned. In Fig. 6.6, it is possible to observe that the five groups of stakeholders (subdivided in their respective countries) clearly differentiate themselves in how they describe brownfields. The results are represented through radar graphs. The tips of the pentagon represent the five characteristic identified within the CABERNET definition and the graph indicates the percentage of respondents that explicitly included the five characteristics within the definition they provided (the centre of the pentagon corresponds to 0% of respondents, while the most external line indicates the 100%). What is not indicated in the graphs of Fig. 6.7 but is worth mentioning, is that some definitions provided by the respondents highlighted a topic not directly mentioned in the CABERNET definition: some respondents focused indeed on the lack of economic attractiveness that may characterise brownfield land. They described brownfield land as a land, which is not economically worth, of any interest for the market, not developable without financial support and, at the same time, unable to attract investors and financial investments.

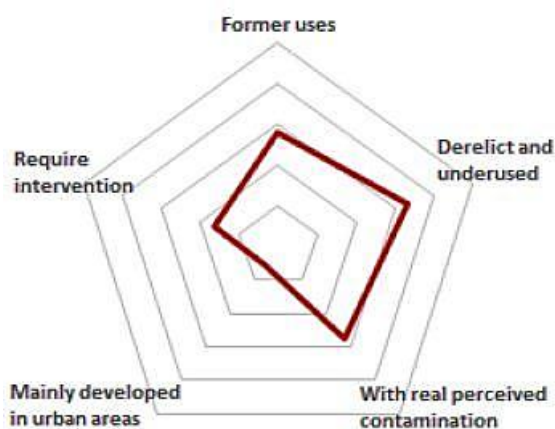
All respondents from Czech Republic described brownfields as derelict and underused sites, while none of them indicated the need for intervention and their main location. In the German and Polish groups, all the characteristics, with exception of the one indicating the presence of brownfield mainly in urban areas, are more equally distributed. On the other hand, none of the five characteristics has been mentioned by all the respondents. By observing the Italian definitions is possible to affirm that the perception of a brownfield is the one of a derelict and underused site, which is affected by environmental contamination. The graph that originates from Romanian definitions considerably differs from all the previous ones because the respondents are all focused only on the contamination of the site. This can be explained because in Romania brownfields are actually considered as contaminated sites.

P2-Q1_According to your work experiences and activities, could you provide us your own description of a brownfield site?

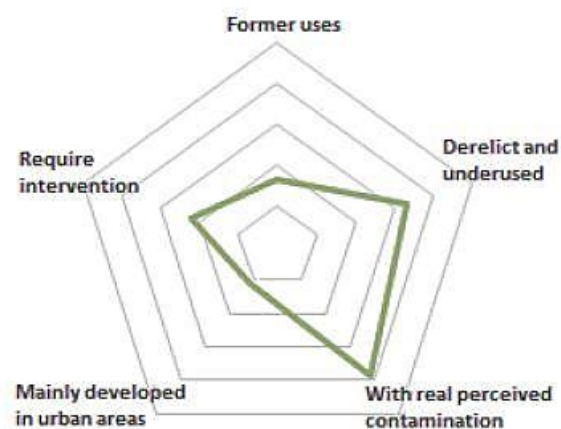
Czech Republic profile of brownfield perceptions



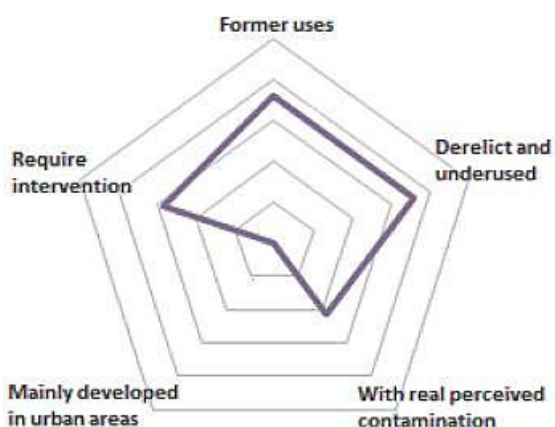
Germany profile of brownfield perceptions



Italy profile of brownfield perceptions



Poland profile of brownfield perceptions



Romania profile of brownfield perceptions

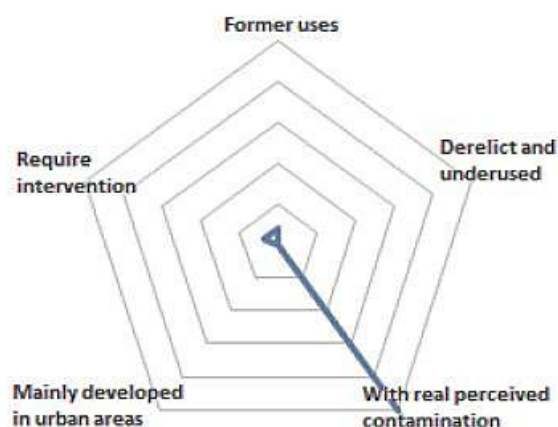


Fig. 6.7 - Radar graphs representing how respondents from the five countries describe a brownfield.

P2-Q2_In your opinion, which and to what extent are the most significant concerns that the presence of a brownfield site can raise in the nearby territory and the surrounding community? Please, assign one value for each entry.

Question P2-Q2 aimed at analysing the perception of respondents about the concerns that the presence of a brownfield might generate. Respondents were asked to give a value for each concern on a scale from “None” (1 point) to “Very High” (5 points). Respondents were also allowed to not provide any score to the one or more entries. The sum of the points provided by the respondents for each “concern” gave the result that is presented in Fig. 6.8. All the entries have obtained a relevant score showing that the presence of a brownfield raises different concerns for the people who have to deal with them or are affected by their presence. Data have been presented without subdividing the countries because the trend was similar in all of them. In addition, Fig. 6.9 shows the distribution of answers for each entry. The two entries with the highest rate are the concerns for environmental pollution and for the loss of property value of the surrounding area. Oppositely, the entry that generates less concern among experts in brownfield regeneration is the reduction of local opportunities. Also other concerns have been pointed out: future profitability of the municipality, development paralysis (due to the inability to add new factories, plants, establishments or to expand the existing ones), worsening of the image of the owner, levelling of the advantages generated by the spatial aesthetic of the surrounding area, and worsening of the image of town.

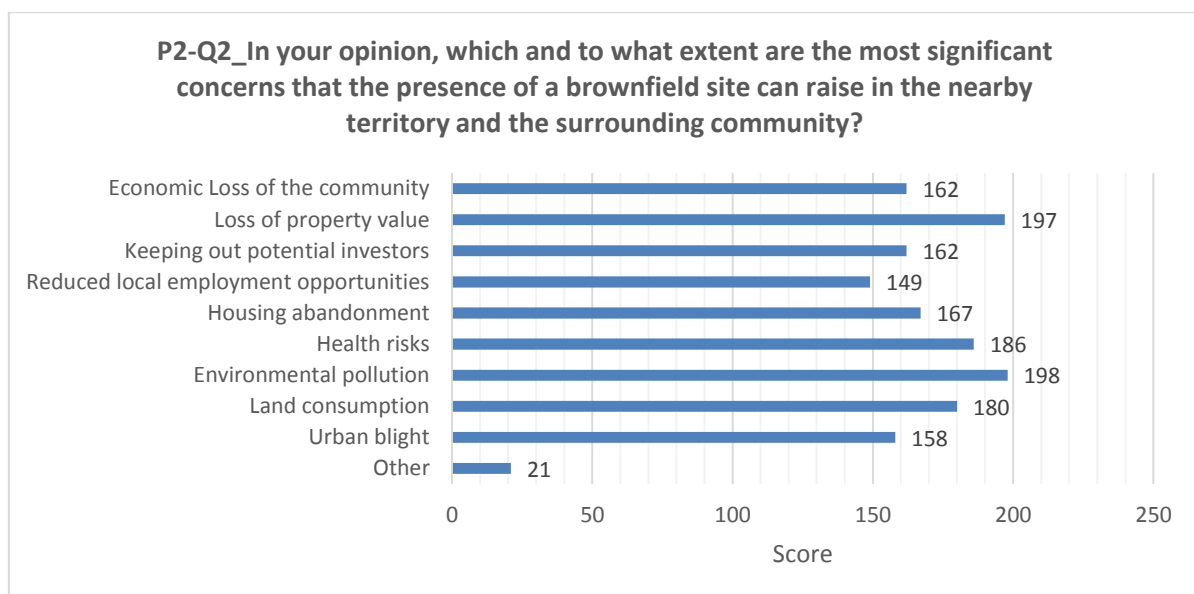


Fig. 6.8 - Clustered bar chart representing the concerns that the presence of a brownfield might raise between the respondents to the questionnaire.

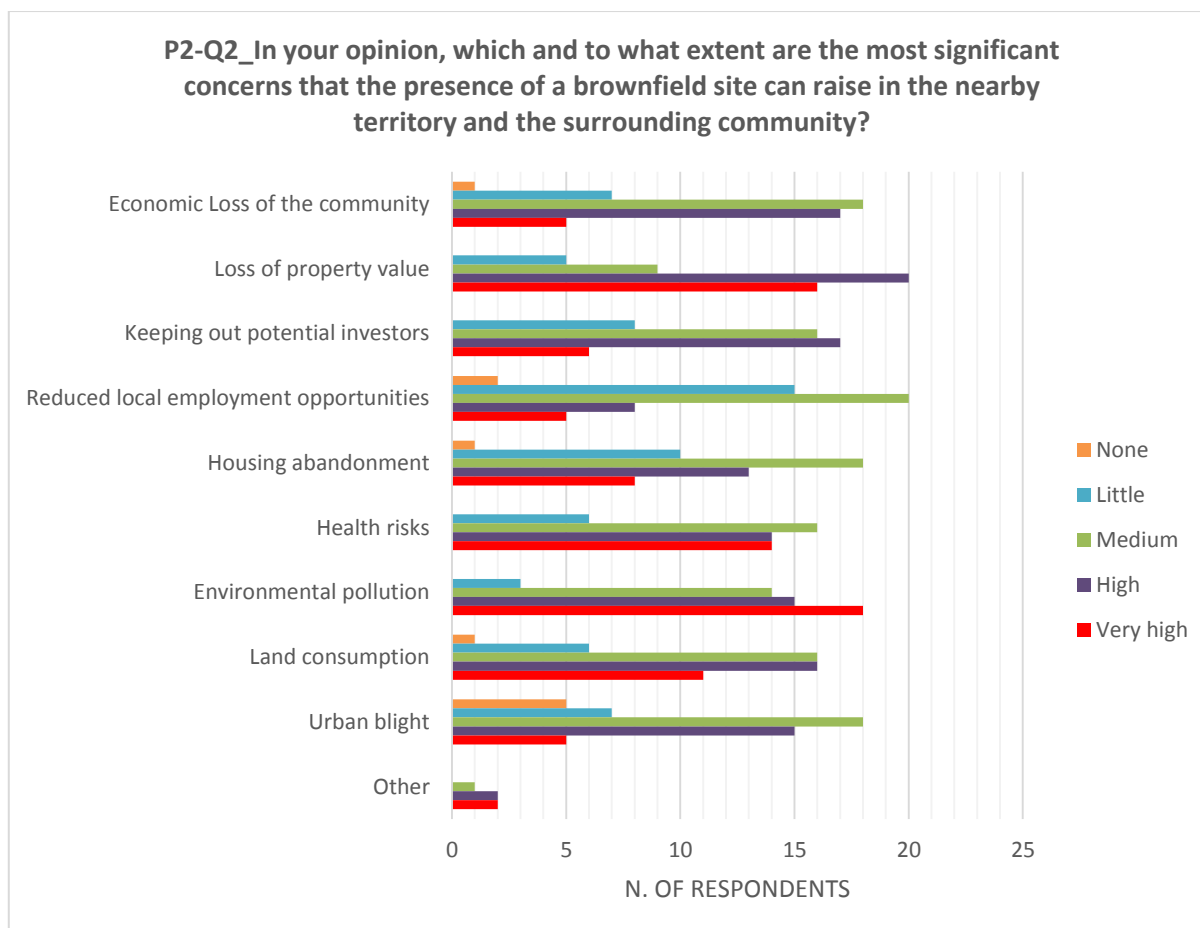


Fig. 6.9 - Distribution of the answers for each entry (concerns). Respondents could indicate 5 different levels of concern for each entry: none, little, medium, high, very high.

P2-Q3_ From your point of view, to what extent is the regeneration of BFs important if it is to be weighed against the corresponding costs:

In the third and last question of the second part of the questionnaire, it was asked to stakeholder to indicate, in their opinion, under which conditions a brownfield regeneration process should take place. They were asked to select only one of the following answers:

- A.** I think it should be done only if the expected economic benefits from the future use of the revitalised site exceed the costs by a significant margin.
- B.** I think it should be done even if the economic benefits are roughly equal to the costs because environmental and social benefits are evident.
- C.** I think it should be done even if the economic benefits are lower than the costs because environmental and social benefits are evident.

D. I think it should be done even if the economic benefits are either absent or highly uncertain because environmental and social benefits are evident.

They were also asked, through an open-ended question, to provide a written motivation of their previous choice. In Fig. 6.10 the percentage obtained by each option for each country is reported and from this figure it is possible to observe that answers number C and D were the most selected options. This result can be however justified by the possible tendency of respondents to choose the most “virtuous” possibilities. By analysing the answers to the open-ended questions this assumption results more evident. If, on one hand, it is generally recognised that environmental and social benefits can generate, as a consequence, economic benefits in the long term, on the other hand, it is often specified that economic factors cannot be avoided and should be always considered. In addition, a consistent number of respondents pointed out the necessity to identify the subject that should cover the economic costs of the regeneration of a brownfield when this might not be able to generate profits in the short-term.

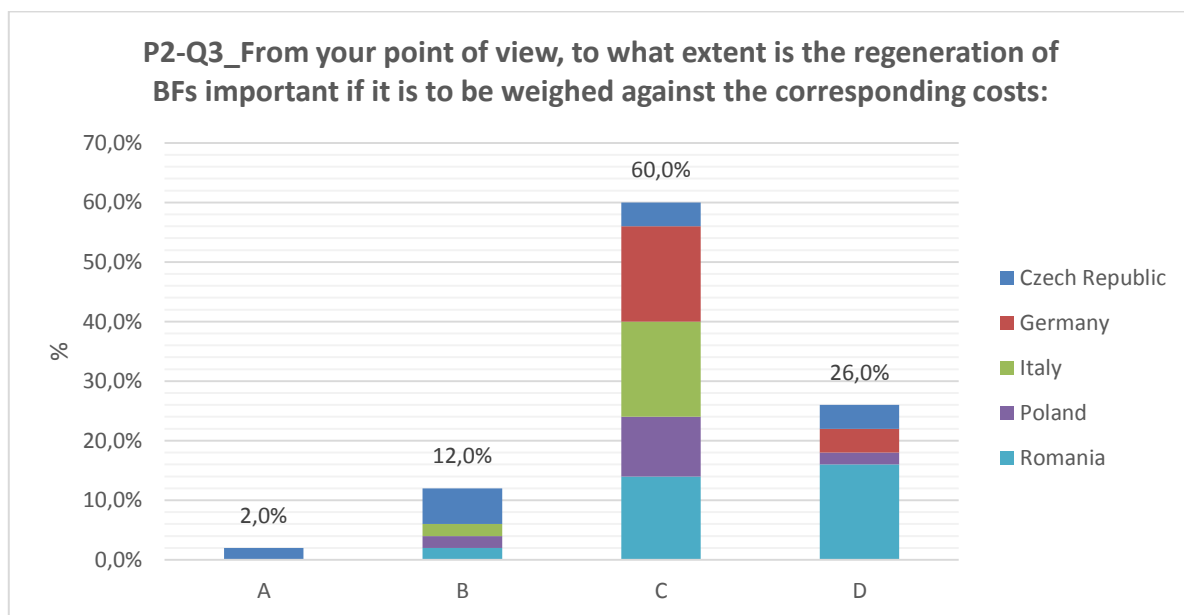


Fig. 6.10 - Distribution of the answers provided by the respondents about under which conditions a brownfield regeneration process should take place. A: I think it should be done only if the expected economic benefits from the future use of the revitalised site exceed the costs by a significant margin; B: I think it should be done even if the economic benefits are roughly equal to the costs because environmental and social benefits are evident; C: I think it should be done even if the economic benefits are lower than the costs because environmental and social benefits are evident; D: I think it should be done even if the economic benefits are either absent or highly uncertain because environmental and social benefits are evident.

6.2.3 TIMBRE framework evaluation and opinions on the Expert System

P3-Q1_Based on your knowledge and according to the aforementioned main aim of your work and the information that you need to perform your work, provide an assessment of the proposed framework for the collection of available information on brownfield regeneration.

Question P3-Q1 stakeholders were asked to evaluate the framework. They were guided through the evaluation of the framework with a series of instructions that asked them:

- to select the categories of information on brownfield regeneration fundamental for their work;
- to sort the selected categories in the temporal sequence functional to their objectives within the brownfield regeneration process (from 1, indicating the first categories, to n , indicating the last category with n being equal to the number of selected categories of information);
- to rank the selected categories in order of importance, always referring to their objectives within the brownfield regeneration process (from 1, indicating the first categories, to n , indicating the last category with n being equal to the number of selected categories of information);
- to add new categories of information by providing a title and a description of the category itself;
- to add general comments to the framework containing feedback regarding its structure and functionality;
- to add comments to the selected categories of information containing suggestions about their content.

Classifications of the Categories of information

For the evaluation of the two classifications (temporal sequence and importance ranking) of the categories of information the Kemeny-Young method has been adopted (Kemeny, 1959; Kemeny & Snell, 1960; Young & Levenglick, 1978; Young, 1988). The Kemeny-Young method is a statistical method able to analyse different rankings of elements and find the most popular ranking among them. The winner might also not be one of the list provided by the respondents, but a new rank which takes into account all the rankings provided by the respondents. The method considers all possible rankings provided by the respondents and gives a score to each one of them. It is not

mandatory for respondents to rank all the elements. Those categories that were not classified are interpreted as “least preferred” and they go to the bottom of the rank. The ranking with the highest score is the most agreed between all the respondents. The Kemeny-Young method consists of two steps. The first step consists in the creation of a “paired-comparison matrix”, which counts pairwise voter preferences. Immediately after, in the second step, all the possible rankings are studied and, as a result, they receive a score. The score for each classification consists in the sum of the pairwise counts (calculated in the paired-comparison matrix) that are present in that specific ranking. The objective was to identify the two classifications for every category of stakeholder. It was possible to define the classifications of 11 categories. For the “Site neighbour”, “Contractor” and “End-use” categories of stakeholder, only one respondent answered to the question. As a result, the classifications of these categories represent the point of view of only one individual. It is also important to highlight the fact that respondents were able to represent themselves in more than one category of stakeholder (see P1_Q2 of the questionnaire) and, in the analysis of the classifications, this condition must be taken into account. When a ranking is made of less than 13 elements, it means that respondents belonging to that group of stakeholders did not select all the categories of information. If none of the respondents selected a specific category, this is not included in the classifications.

The results for both typologies of classifications were also analysed considering all the respondents as a single group, thus obtaining two “averaged” classifications for all respondents (Table 6.4a). They were used to compare the other rankings in order to evaluate “anomalous” results. Considering the totality of respondents, the socio-economic assessment results as the most relevant category of information. Regarding the temporal order, the ranking does not present any evident anomaly. The categories of information are positioned in a reasonable order, which indicates that the adopted methodology has provided valid results.

Table 6.4(a) - Classifications resulting from the totality of respondents.

Classifications resulting from the totality of respondents	
Relevance order	Temporal order
Socio-economic assessment	Strategic planning
Investigation (preliminary/detailed)	Investigation (preliminary/detailed)
Strategic planning	Building and infrastructure documents
Risk assessment (qualitative/quantitative)	Risk assessment (qualitative/quantitative)
Funding and financing	Remediation strategies and options
Remediation strategies and options	Socio-economic assessment
Remediation technologies evaluation and selection	Remediation technologies evaluation and selection
Decision-making and communication	Requalification plan development
Implementation, control, monitoring (land back to market)	Decision-making and communication
Building and infrastructure documents	Funding and financing
Requalification plan development	Deconstruction/re-use of structures materials
Deconstruction/re-use of structures materials	Waste management
Waste management	Implementation, control, monitoring (land back to market)

In the following page, the tables containing the “relevance order” and “temporal order” classifications for each category of stakeholder are presented. Here, some considerations of the outcomes provided by the classifications are presented.

42 respondents answered to this question. Of these, two respondents stated that they could not provide a ranking of the relevance of the categories in which they are involved because such categories are all fundamental for their jobs. Several categories of stakeholders have selected all the 13 categories of information, indicating that these stakeholders might be involved for all the duration of the brownfield regeneration process. In general terms, the temporal orders identified by the different stakeholder categories result similar to each other. There are no anomalies, except in the case of the “Local authority (town or city)” (Table 6.4d), where the category of information “Strategic Planning” is placed at the penultimate place. This can be explained by the fact that, for that stakeholder category, only three respondents answered the question. One of them, maybe for a mistake, set the “Strategy Planning” category in the last place, thus influencing the final result. It results interesting how, in the temporal order, the “Funding and financing” information category is never present in the first places, but always in the middle or even lower. Another aspect of the temporal order to consider is the fact that the “Requalification plan development” category does not seem to achieve a common position

among the categories of stakeholders (some categories classified it in the first places, while others in lower positions).

The situation is different regarding the relevance orders resulting from the different categories of stakeholders. Here differences are more evident and some of them provide useful suggestions. Outcomes resulting from the “Site owner” category (Table 6.4b) highlight the importance of the “funding and financing” and the “socio-economic assessment” categories of information, while other more technical categories follow them. “Strategic planning” is considered as the most relevant category of information. This situation suggests that site owners consider important their participation in the definition of the regeneration process of their site. The “Site neighbour” stakeholder category (Table 6.4c) placed in the first position the “Strategic planning” category of information. Reasons to this can be similar to those of the site owners. It might have been expected that categories of information such as “Decision-making and communication” and “Socio-economic assessment” gained higher position in the relevance order of this typology of stakeholders. Anyway, the presence of only one respondent in this category might make this result less significant. Also the “Local authority (town or city)” stakeholder category (Table 6.4d) placed in the first position of the relevance order the “Strategic planning” category of information. Successively, the focus shifts toward socio-economic and communicative aspects of the brownfield regeneration process by placing the “Decision-making and communication” and the “Socio-economic assessment” in the second and third place. This result is probably due to the fact that local authorities are those more in contact with the local community. Another aspects that stands out in this relevance order is the position of the “Funding and financing” category, which resulted in the last position. In Table 6.4e, which describes the “Region and sub-regional government” stakeholder category, “funding and financing” results at the first place in order of importance. Such category of information is generally presented in the first places also in the relevance orders of the other typologies of stakeholders, except for the case of the “Local authority (town or city)” stakeholder category (Table 6.4d). This confirms the results of the previous questions, in which the economic aspect was mentioned as a fundamental element to consider within the brownfield regeneration process. The “Regional and National regulators” stakeholder category (Table 6.4f) places at the beginning of its relevance order those categories that regard investigation, risk assessment and remediation strategies and options. Differently, the “Local community groups” (Table 6.4g) and “Public interest groups” (Table 6.4h) stakeholder categories classify most relevant categories

different kind of information. They prioritise the strategic planning, funding and financing and the socio-economic assessment. This suggests their willingness in participating in fundamental aspects of the regeneration process that are essential for its development. The “Consultant” stakeholder category (Table 6.4i) shows a more technical profile, giving more importance to those technical phases in which they probably have an interest. It is possible to observe how the “socio-economical” information category lose places respect to the previous types of stakeholders. The “Scientific community and researcher” category (Table 6.4l) classifies the “remediation strategies and options” as the most relevant category, followed by the “Socio-economic assessment” and the “Investigation preliminary/detailed)” categories. This suggests that different typologies of researchers took place in the questionnaire and they are not only focused on technical aspects but also on socio-economic attributes of the brownfield regeneration process.

Table 6.4(b) - Classifications resulting from “Site owner” respondents.

Relevance order	Temporal order
Strategic planning	Strategic planning
Funding and financing	Investigation (preliminary/detailed)
Socio-economic assessment	Building and infrastructure documents
Investigation (preliminary/detailed)	Risk assessment (qualitative/quantitative)
Risk assessment (qualitative/quantitative)	Remediation technologies evaluation and selection
Remediation technologies evaluation and selection	Requalification plan development
Implementation, control, monitoring (land back to market)	Funding and financing
Building and infrastructure documents	Implementation, control, monitoring (land back to market)
Remediation strategies and options	Remediation strategies and options
Decision-making and communication	Socio-economic assessment
Requalification plan development	Decision-making and communication
Deconstruction/re-use of structures materials	Deconstruction/re-use of structures materials
Waste management	Waste management

Table 6.4(d) - Classifications resulting from “Local authority (town or city)” respondents.

Relevance order	Temporal order
Strategic planning	Investigation (preliminary/detailed)
Investigation (preliminary/detailed)	Funding and financing
Decision-making and communication	Decision-making and communication
Socio-economic assessment	Socio-economic assessment
Requalification plan development	Building and infrastructure documents
Deconstruction/re-use of structures materials	Risk assessment (qualitative/quantitative)
Implementation, control, monitoring (land back to market)	Remediation strategies and options
Remediation strategies and options	Remediation technologies evaluation and selection
Risk assessment (qualitative/quantitative)	Deconstruction/re-use of structures materials
Waste management	Requalification plan development
Remediation technologies evaluation and selection	Implementation, control, monitoring (land back to market)
Building and infrastructure documents	Strategic planning
Funding and financing	Waste management

Table 6.4(c) - Classifications resulting from “Site neighbour” respondents.

Relevance order	Temporal order
Strategic planning	Strategic planning
Investigation (preliminary/detailed)	Investigation (preliminary/detailed)
Remediation strategies and options	Remediation strategies and options
Funding and financing	Requalification plan development
Decision-making and communication	Funding and financing
Requalification plan development	Decision-making and communication
Socio-economic assessment	Waste management
Waste management	Socio-economic assessment

Table 6.4(e) - Classifications resulting from “Region and sub-regional government” respondents.

Relevance order	Temporal order
Funding and financing	Strategic planning
Risk assessment (qualitative/quantitative)	Investigation (preliminary/detailed)
Decision-making and communication	Building and infrastructure documents
Investigation (preliminary/detailed)	Risk assessment (qualitative/quantitative)
Remediation technologies evaluation and selection	Remediation strategies and options
Waste management	Remediation technologies evaluation and selection
Remediation strategies and options	Waste management
Implementation, control, monitoring (land back to market)	Requalification plan development
Deconstruction/re-use of structures materials	Deconstruction/re-use of structures materials
Strategic planning	Implementation, control, monitoring (land back to market)
Socio-economic assessment	Socio-economic assessment
Requalification plan development	Decision-making and communication
Building and infrastructure documents	Funding and financing

Table 6.4(f) - Classifications resulting from “Regional and national Regulator” respondents.

Relevance order	Temporal order
Investigation (preliminary/detailed)	Strategic planning
Remediation strategies and options	Investigation (preliminary/detailed)
Risk assessment (qualitative/quantitative)	Risk assessment (qualitative/quantitative)
Strategic planning	Socio-economic assessment
Funding and financing	Remediation strategies and options
Socio-economic assessment	Funding and financing
Remediation technologies evaluation and selection	Remediation technologies evaluation and selection
Decision-making and communication	Decision-making and communication
Building and infrastructure documents	Building and infrastructure documents
Requalification plan development	Requalification plan development
Deconstruction/re-use of structures materials	Deconstruction/re-use of structures materials
Waste management	Waste management
Implementation, control, monitoring (land back to market)	Implementation, control, monitoring (land back to market)

Table 6.4(h) - Classifications resulting “Public interest group” respondents.

Relevance order	Temporal order
Strategic planning	Strategic planning
Funding and financing	Investigation (preliminary/detailed)
Socio-economic assessment	Building and infrastructure documents
Investigation (preliminary/detailed)	Remediation strategies and options
Remediation strategies and options	Socio-economic assessment
Risk assessment (qualitative/quantitative)	Remediation technologies evaluation and selection
Remediation technologies evaluation and selection	Risk assessment (qualitative/quantitative)
Decision-making and communication	Funding and financing
Building and infrastructure documents	Decision-making and communication
Requalification plan development	Requalification plan development
Deconstruction/re-use of structures materials	Deconstruction/re-use of structures materials
Waste management	Waste management
Implementation, control, monitoring (land back to market)	Implementation, control, monitoring (land back to market)

Table 6.4(g) - Classifications resulting from “Local community group” respondents.

Relevance order	Temporal order
Strategic planning	Strategic planning
Socio-economic assessment	Investigation (preliminary/detailed)
Funding and financing	Building and infrastructure documents
Building and infrastructure documents	Remediation strategies and options
Investigation (preliminary/detailed)	Socio-economic assessment
Risk assessment (qualitative/quantitative)	Remediation technologies evaluation and selection
Remediation technologies evaluation and selection	Risk assessment (qualitative/quantitative)
Remediation strategies and options	Requalification plan development
Decision-making and communication	Decision-making and communication
Requalification plan development	Funding and financing
Deconstruction/re-use of structures materials	Deconstruction/re-use of structures materials
Waste management	Waste management
Implementation, control, monitoring (land back to market)	Implementation, control, monitoring (land back to market)

Table 6.4(i) - Classifications resulting “Consultant” respondents.

Relevance order	Temporal order
Investigation (preliminary/detailed)	Strategic planning
Strategic planning	Investigation (preliminary/detailed)
Risk assessment (qualitative/quantitative)	Building and infrastructure documents
Funding and financing	Risk assessment (qualitative/quantitative)
Remediation technologies evaluation and selection	Remediation strategies and options
Implementation, control, monitoring (land back to market)	Remediation technologies evaluation and selection
Building and infrastructure documents	Requalification plan development
Remediation strategies and options	Decision-making and communication
Decision-making and communication	Funding and financing
Socio-economic assessment	Socio-economic assessment
Requalification plan development	Deconstruction/re-use of structures materials
Waste management	Waste management
Deconstruction/re-use of structures materials	Implementation, control, monitoring (land back to market)

Table 6.4(j) - Classifications resulting “Contractor” respondents.

Relevance order	Temporal order
Investigation (preliminary/detailed)	Strategic planning
Strategic planning	Investigation (preliminary/detailed)

Table 6.4(k) - Classifications resulting “End-use” respondents.

Relevance order	Temporal order
Decision-making and communication	Strategic planning
Strategic planning	Requalification plan development
Requalification plan development	Decision-making and communication
Funding and financing	Funding and financing

Table 6.4(l) - Classifications resulting “Scientific community and researcher” respondents.

Relevance order	Temporal order
Remediation strategies and options	Strategic planning
Socio-economic assessment	Investigation (preliminary/detailed)
Investigation (preliminary/detailed)	Building and infrastructure documents
Decision-making and communication	Risk assessment (qualitative/quantitative)
Strategic planning	Remediation strategies and options
Funding and financing	Decision-making and communication
Risk assessment (qualitative/quantitative)	Socio-economic assessment
Remediation technologies evaluation and selection	Funding and financing
Deconstruction/re-use of structures materials	Remediation technologies evaluation and selection
Implementation, control, monitoring (land back to market)	Requalification plan development
Building and infrastructure documents	Deconstruction/re-use of structures materials
Waste management	Waste management
Requalification plan development	Implementation, control, monitoring (land back to market)

Evaluation of the structure of the framework

In the same question, it was also asked to suggest potential changes in the structure of the TIMBRE framework. In order to evaluate and decide whether or not implementing the suggestions provided by the respondents for the improvement of the framework, a specific qualitative methodology has been defined:

1. study of the answers: the answers were collected, read and thoroughly analysed, in order to identify the level and typology of proposed changes for the framework;
2. clarity of the answers: it has been evaluated the clarity and completeness of the responses. Poor responses without a clear explanation of the proposed suggestions were neglected;
- 3a. evaluation of new categories or content: every proposed addition of one or more categories or a content has been analysed and it has been checked if the content of such proposition was already present in the TIMBRE framework;
- 3b. evaluation of structural changes: big structural changes such as the merging/splitting of categories, if accompanied with a clear and well-described motivation (point 2, clarity of the answer), were considered only if expressed by more respondents;
4. involvement of the other TIMBRE partners: if a response respected the points 2 and 3 and raised a specific interest, it was subsequently submitted to the other TIMBRE partners. It was asked them to give an opinion about the proposed change. Partners belonging to the same country of the respondent were asked to give a more in-depth evaluation of the answer by referring to the situation in their own country.

12 respondents expressed opinions on the structure of the framework. The majority expressed a positive opinion about the structure of the TIMBRE framework, while two respondents considered the structure too complex. One respondent, belonging to the “Local community groups” and “Scientific community and researchers” stakeholder categories, suggested to reduce the categories to a number of three or four. The second respondent, belonging to the “Media” stakeholder category, affirmed that the structure appears too complex but, at the same time, s/he is aware of the fact that all the mentioned categories have to be taken into account to successfully regenerate a brownfield.

Another respondent (“Consultant” stakeholder category) highlighted that the structure of the framework is too focused on the technical aspects of remediation, overlooking other

fundamental points. S/He affirmed that the planning of the future use should have more relevance within the framework. The respondent also affirmed that, since the framework will be used by different categories of stakeholders, technical definitions must be clearly defined and explained because some terms have different meaning among different categories of actors (e.g., the term remediation in the real estate industry has a different meaning than in the environment area). This observation was confirmed by another respondent, belonging to the “Consultant” stakeholder category, which specified that s/he interpreted the terms from the perspective of urban planning.

Regarding the possible additions of new categories of information, eight suggestions have been received. Of the eight proposed categories, six were not accompanied with any description and four are already present in the version of the TIMBRE framework presented in the questionnaire (fourth version of the TIMBRE framework, see Fig. 6.1). Ultimately, none of the proposed categories allowed an evaluation for a possible implementation.

In conclusion, through this question it has been possible to confirm the fourth version of the TIMBRE framework (Fig. 6.1). This final version has successively been implemented in the Expert System.

P3-Q2_Considering the categories and areas of expertise in which you are more involved with, do you have available documents about each of these categories? (e.g. regulations, guidelines, tools, case studies, etc.).

The idea at the base of this question was to know how many of the respondents possess documents concerning regulation, guidelines, tools, case studies, etc. that can be referred into the categories of information proposed by the TIMBRE framework. The TIMBRE Expert System (see Chapter 1) will give to users the opportunity to upload new information and it is expected that its contents will be developed along with the progressive use by stakeholders. The results, shown in Fig. 6.11, indicate that the 57,8% of the respondents (26 respondents out of 45 who answered to this question) affirmed that they possess documentation potentially useful for the population of the Expert System.

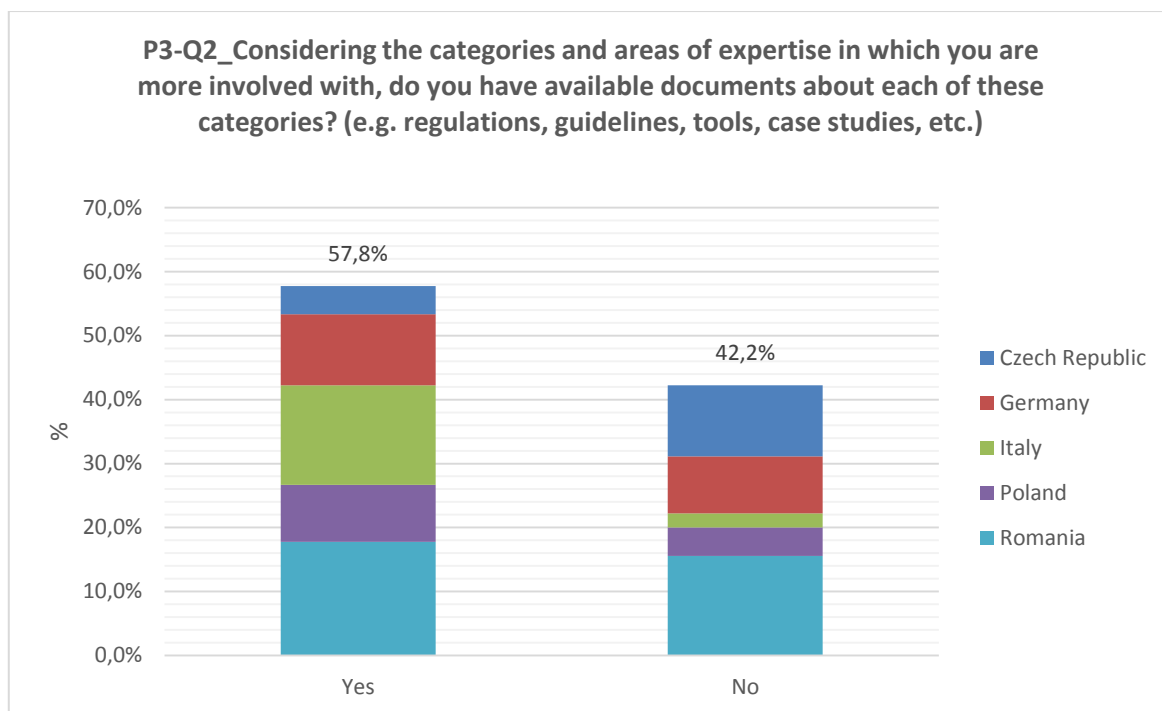


Fig. 6.11 - Clustered column chart indicating the percentage of respondents that think to have available documents about the categories of information they selected in question P3-Q1.

P3-Q3_As stated above, the aim of the framework is to create the basis of an Expert System that can collect and provide stakeholders with all the available information for the redevelopment of brownfields. Do you think that such an Expert System could be helpful for you when dealing with the brownfield regeneration process? Please select only one option.

In this question, the respondents had the possibility to indicate their opinion about the usefulness of the Expert System structured according to the information categories identified in the TIMBRE framework. They were asked to indicate their answer by selecting one option between: not helpful at all, not very helpful, moderately helpful, very helpful, and extremely helpful. Results are presented in Fig. 6.12. No one indicated the “not helpful at all” but the 6,4% (3 respondents) indicated “not very helpful”. The reasons why these respondents answered in this way can be identified by anticipating their answer to the question P3_Q4: two of them indicated that their work activity is currently not concerned with the brownfield regeneration so they do not find it useful. The third answer states that what really matters is not how to deal with normative or technical guidelines but how to attract investment and monetary capital. Even in this question the economic aspect comes out, confirming its fundamental importance. It is therefore likely to assume that the respondents see in the Expert System not only a tool for

technical/scientific resources, but also for those regarding economic, financial and social aspects of brownfield regeneration.

The 66% of respondents indicated the Expert System and its structure as very or extremely helpful. It is important to notice that the option “extremely helpful” has been predominantly chosen by respondents of the Romanian group. Such situation can be justified by the fact that in Romania there is a lack of available on-line information regarding the brownfield regeneration process. Actors of those countries with short experience in the management of brownfields and with a lack of easily accessible material (e.g. through the web) might therefore be unable to find the most suitable information they need. Thus, a tool like the Expert System can represent an ideal solution for those countries that necessitate a support for their decisions within the brownfield regeneration process.

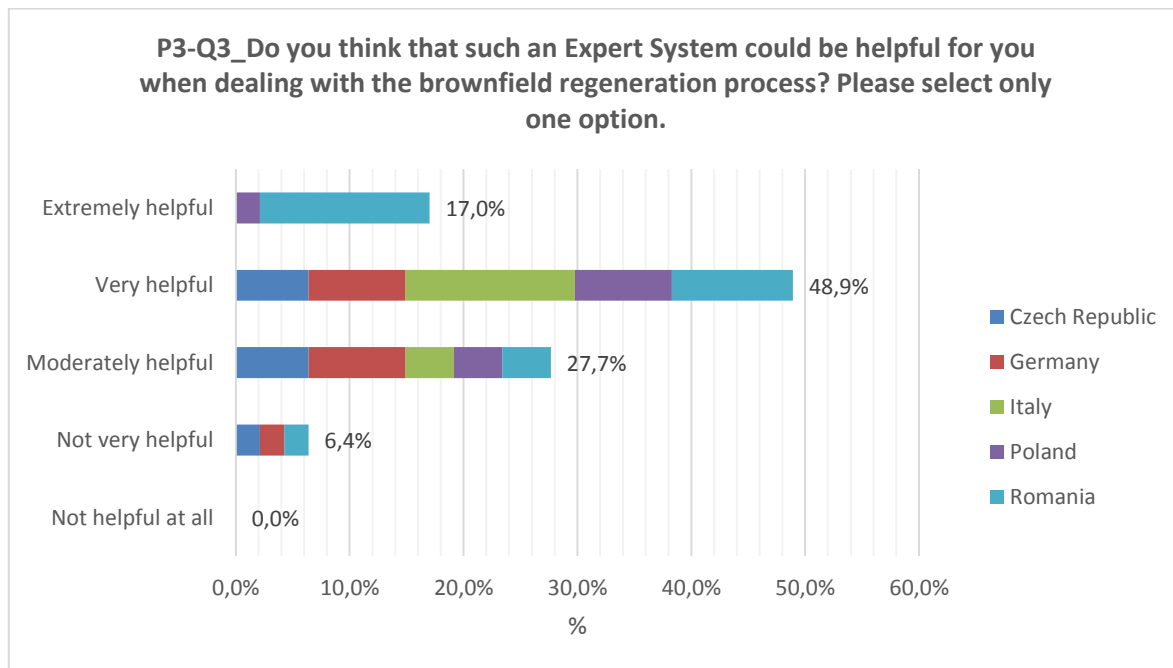


Fig. 6.12 - Clustered bar chart showing opinion of respondents on the helpfulness of the Expert System structured according to the information categories provided in the TIMBRE framework.

P3-Q4_Would you use the Expert System?

This question, together with the P3-Q3 was asked in order to evaluate the grade of appreciation of a tool like the Expert System structured in the way the TIMBRE framework indicates. Respondents were asked to indicate if they would use or not the Expert System and they were also asked to provide a motivation for their answer, in order to understand the reasons

(especially in the case of a negative point of view) and to plan the expedients that could be adopted to improve the usefulness of the Expert System. This question, as possible to observe in Fig. 6.13, confirmed the results of the previous questions. In fact, only the 11% indicated that they would not use the Expert System. The reasons provided by the respondents that answered “No” to this question, can be summarised as follow:

- the respondents (3 out of 5) are not currently involved in the brownfield regeneration process so they don’t find the tool useful to their purposes;
- the respondents (2 out of 5) believe that the structure represented by the TIMBRE framework is too complicated for their purposes and they cannot completely understand it.

It is also interesting to observe the provided motivations by those respondents that answered “Yes” to the question. Several respondents provided as motivation for the utilisation of the Expert System the need for a tool able to collect information (in the form of regulation, technical manuals, tools and case studies) regarding the brownfield regeneration process. More precisely, what they reputed fundamental was the possibility to filter and organise the information in the most suitable way so as to meet the needs of their activity. Another important consideration expressed by respondents was the necessity to know goals, points of view and procedures adopted by the multiplicity of stakeholders with whom they have to collaborate. Due to the interdisciplinary nature of the process, many actors do have specialised knowledge in certain areas but in other areas they only have basic education. In this sense, also by further developing the analysis of connections between different categories of stakeholders (as observed in P1_Q4), the Expert System could become an ideal tool for the users.

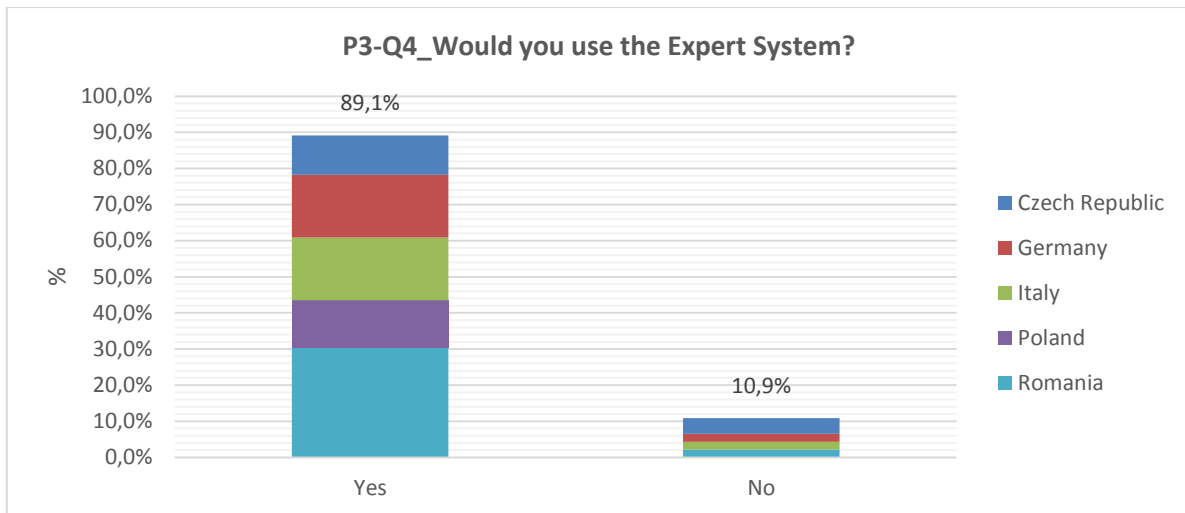


Fig. 6.13 - Clustered column chart indicating the percentage of respondents that would use the Expert System for their activities.

P3-Q5_In the future the Expert System will be tested: could you be interested in being involved in its validation through an assessment of the information that it will make available to end users?

The last question of part 3 of the questionnaire was aimed at knowing who was willing to continue the collaboration process in order to further improve the Expert System. Results are presented in Fig. 6.14, where it can be seen that roughly the 65% of respondents answered positively to the questions. In the “No” group also blank answers were counted. Comparing this data with those of question P3-Q2 will also help in identifying those stakeholders who want to continue the collaboration and can be contacted also in order to upload material in the Expert System.

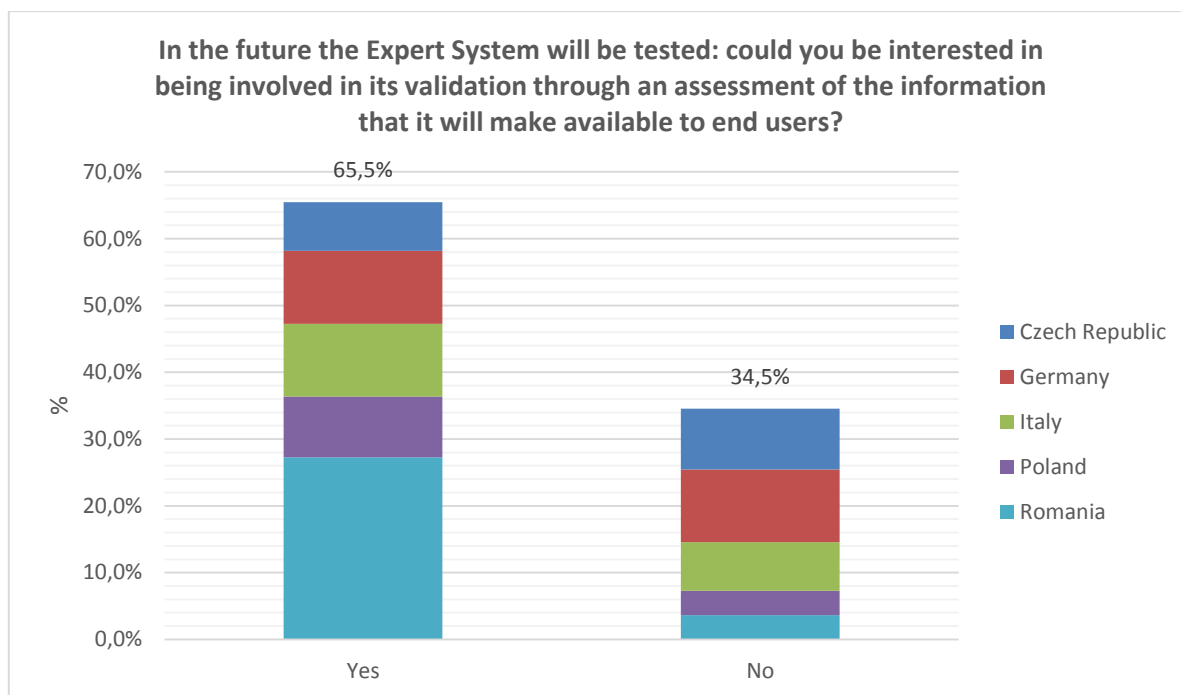


Fig. 6.14 - Clustered column chart indicating the percentage of respondents that showed interest in continuing the collaboration process for the implementation of the Expert System.

7. Conclusions

The main objectives of the thesis were the creation and attainment of a shared framework for the collection of available information on brownfield regeneration (TIMBRE framework) and the development and implementation of a methodology for the engagement of stakeholders, aimed at evaluating and improving this framework. The TIMBRE framework will serve as a foundation for the TIMBRE Expert System, which will allow users to easily access, consult and evaluate available information on brownfield regeneration process (e.g., approaches, methodologies, tools, best-practices). As explained in Chapter 4, the stakeholder engagement process represents one of the steps of the TIMBRE framework development process. Such condition and the common objectives make them closely related between each other.

The stakeholder involvement process was aimed at collecting feedback, suggestions, comments and opinions in order to improve the structure and usefulness of the framework and to obtain a result shared by its potential users. The interaction with stakeholders took place in particular during the two operative phases of the engagement process. The first operative phase consisted in the organisation and implementation of a series of meetings in the form of workshops and focus groups. Such typologies of meetings have proved being productive and able to stimulating the interest and participation of stakeholders. The discussions that took place during these events highlighted a series of weaknesses of the TIMBRE framework that were not noticed during the previous developmental steps. Such observations and ideas have been fundamental for the improvement of the TIMBRE framework's structure and therefore for its effectiveness and usability within the Expert System. A positive aspect of workshops and meeting was the possibility to capture the impressions of stakeholders in that very exact moment. This allowed to get a better comprehension of their concerns and doubts, thus lowering the risk of misunderstanding between stakeholders and researchers. Moreover, such methodologies stimulated stakeholders' willingness to share their ideas and opinions, as observed in the articulated debates that took place. On the other hand, workshops and focus groups presented some weaknesses. First, meetings can be quite demanding in terms of time and resources required from both involved parties, stakeholders and researchers. Second, conducting the meetings in the stakeholders' native language necessitated the use of a native speaker facilitator. This situation led to an extension of the process before and after the meetings. The

facilitator needed indeed to be instructed on the objectives of the meetings in order to lead them and the transcripts resulted from the audio recordings of the meetings needed to be translated in order to be examined.

The second operative phase of the engagement process consisted in the administration of a web-based questionnaire. A total of 55 questionnaires out of 183 (30%) sent were returned. The questionnaire also involved stakeholders “external” to the TIMBRE project and this gave the possibility to obtain feedback, suggestions, comments and opinions from individuals analysing the framework for their first time. Moreover, in this way the number of respondents to the questionnaires increased, thus giving the possibility to obtain measurable statistics.

The first part of the questionnaire allowed defining profiles of the respondents. It resulted that there are no definite profiles: respondents tend to represent different categories of stakeholders and are often involved in multiple activities within the brownfield regeneration process. It was also possible to observe that the different stakeholder categories have many connections between each other. This suggested the need of stakeholders to work in very close contact with many other experts with different tasks. The second part of the questionnaire allowed to define how respondents perceive brownfields. Even in this case, different profiles resulted from the analysis of the five different groups (representing the five nationalities). Observing and analysing these results suggested that users of different countries might interpret and evaluate the structure of the TIMBRE framework in different ways related on how they deal with the management of brownfields. The third part of the questionnaire allowed respondents to evaluate the framework and providing opinions about the Expert System. Here, several differences between countries and categories of stakeholders have been identified. In particular, it was possible to identify interesting connections between specific categories of stakeholders and the categories of information they ranked as the most important. Finally, the respondents that expressed a greater need of the Expert System resulted belonging to those countries that have less experience with the management of brownfield. This result suggested that the Expert System might work also as a platform for the transfer of information between more experienced countries/stakeholders and those with less experience and knowledge.

The questionnaire allowed obtaining more thoroughly described feedback, suggestions, comments and opinions compared to workshops and focus group. Moreover, the questionnaire

allowed to collect quantitative data that can be described through statistical methodologies. On the other hand, also the questionnaire presented some weaknesses. The main issue was related to the number of respondents. Even if 30% corresponds to the average response rate of online questionnaire, in the case at hand it made not always possible to calculate useful statistics, especially when analysing data for the single categories of stakeholders. Some of them were represented by a very few number of respondents and in this case it was more difficult to extrapolate significant conclusions. Another problem was generated by the fact that through a questionnaire it is not possible to directly interact with the respondents. Because of this, it was not possible to clarify doubts and misunderstandings that can generate during the compilation of the questionnaire, even though the questionnaire was translated in the native language of the respondents.

In conclusion, the adopted engagement methodology, developed also with the support of the literature review presented in the work thesis, permitted to achieve the defined objectives. A shared structure of the TIMBRE framework was reached and it has been implemented in the Expert System. . Such structure, accepted by the involved stakeholders, covers all the phases of the brownfield regeneration process and is able to effectively support the organisation of information and their consultation within the Expert System.

This work was also an opportunity to identify the areas that can be further developed during the continuation of the collaboration with the stakeholders for the improvement of the Expert System. The study has highlighted that the involvement of different categories of stakeholders allow a better understanding of their points of view and necessities, therefore it may be important to continue this process also for future steps in order to develop tools (such as the Expert System) suitable to effectively respond to different stakeholders' needs and requirements. Finally, the application of the proposed approach in different European countries has brought to light the presence of peculiarities in the role of stakeholders and in the decisional frameworks of each country, thus this aspect confirms that the national context cannot be neglected when interacting with stakeholders and when proposing them new approaches and tools for brownfield regeneration.

References

- AccountAbility, 2011. *AA1000 Stakeholder Engagement Standard 2011*, s.l.: AccountAbility.
- Adams, D., Disberry, A., Hutchinson, N. & Munjoma, T., 2002. Brownfield land: owner characteristics, attitudes and networks. In: Y. Rydin & A. Thornley, a cura di *Planning in the UK: Agendas for the New Millennium*. Aldershot: Ashgate, pp. 317-336.
- Adams, D. & Watkins, C., 2002. *Greenfields, Brownfields and Housing Development*. I a cura di s.l.:Blackwell Science Ltd.
- Alexandrescu, F., 2012. *Report on Regional Decision Structures and Key Actors*, s.l.: timbre consortium.
- APAT - Agenzia per la protezione dell'ambiente e per i servizi tecnici, 2006. *Proposta di linee guida per il recupero ambientale e la valorizzazione economica dei brownfields*, Roma: APAT - Servizio Stampa ed Editoria.
- Arnstein, S. R., 1969. A Ladder of Citizen Participation. *JAIP*, 35(4), pp. 216-224.
- Australian Government - Department of Immigration and Citizenship, 2008. *Stakeholder Engagement - Practitioner Handbook*, Belconnen: National Communications Branch of the Department of Immigration and Citizenship.
- Bardos, P., 2003. *The Contaminated Land Rehabilitation Network For Environmental Technologies in Europe*, s.l.: CLARINET.
- Bartke, S. et al., 2012. *Introducing the FP7 project timbre: tailored Improvement of brownfield regeneration in Europe*. s.l., s.n.
- Bartsch, C., 2006. *Promoting Brownfield Redevelopment: Role of Public-Private Partnerships*. Washington(D.C.): Northeast-Midwest Institute.
- Bartsch, C. & Collaton, E., 1997. *Brownfields: Cleaning and Reusing Contaminated Properties*. I a cura di Westport(CT): Praeger.
- Bartsch, C. et al., 2004. *Unlocking Brownfields - Key to community revitalization*, s.l.: s.n.
- Bell, S., Morse, S. & Shah, R. A., 2012. Understanding stakeholder participation in research as part of sustainable development. *Journal of Environmental Management*, Issue 101, pp. 13-22.
- Boyatzis, R. E., 1998. *Transforming Qualitative Information: Thematic Analysis and Code Development*. California: Sage.
- Braun, V. & Clarke, V., 2006. Using thematic analysis in psychology. *Qualitative research in Psychology*, Issue 3, pp. 77-101.
- BSR, 2012. *Back to Basics: How to Make Stakeholder Engagement Meaningful for Your Company*, s.l.: BSR.
- CABERNET, 2006. *Sustainable Brownfield Regeneration: CABERNET Network Report*, Nottingham, NG7 2RD, UK: University of Nottingham.

- Calder, B. J., 1977. Focus Groups and the Nature of Qualitative Marketing Research. *Journal of Marketing Research*, 14(3), pp. 353-364.
- Carlton, C., Critto, A., Ramieri, E. & Marcomini, A., 2007. DESYRE: decision support system for rehabilitation of contaminated mega-sites. *Integrated Environmental Assessment and Management*, Issue 3, pp. 211-222.
- COBRAMAN, 2009. *COBRAMAN Report about concepts and tools for brownfield redevelopment activities*, Bydgoszcz: s.n.
- Common Forum, 2010. *Common Forum contribution to ECA audit on Brownfield regeneration in Europe*, Paris: Common Forum.
- Conde, C. & Lonsdale, K., 2004. Engaging Stakeholders in the Adaptation Process. Technical Paper No. 2. In: *Adaptation Planning Framework*. s.l.:UNDP.
- Critto, A. et al., 2002. *DESYRE-DEcision Support sYstem for REhabilitation of contaminated sites: objectives and structures*. Lugano, iEMSs2002, pp. 211-216.
- Dixon, T., 2007. Heroes or Villains? The Role of the UK Property Development Industry in Sustainable Urban Brownfield Regeneration. In: *Sustainable Brownfield - Livable Places from Problem Spaces*. Oxford: Blackwell Publishing Ltd, pp. 98-99.
- Dixon, T. & Doak, J., 2006. *Developer and Investor Responses to Sustainable Urban Brownfield Regeneration: Does Practice Make Perfect?*. London, s.n.
- Dixon, T., Raco, M., Catney, P. & Lerner, D. N., 2007. *Sustainable Brownfield Regeneration. Livable Places from Problem Spaces*, Oxford: Blackwell Publishing.
- Donaldson, T. & Preston, L. E., 1995. The Stakeholder Theory of the Corporation: Concepts, Evidence and Implications. *Academy of Management Review*, 20(1), pp. 65-92.
- Dorsey, J. W., 2003. Brownfields and Greenfields: The Intersection of Sustainable Development and Environmental Stewardship. *Environmental Practice*, 5(1), pp. 69-76.
- EC, 2004. *Towards a Thematic Strategy on the Urban Environment, Communication COM (2004) 60*, Bruxelles: European Commission.
- EC, 2009. *Ex-post Impact Assessment_FP6 sub-priority Global Change and Ecosystems*, s.l.: European Commission.
- EC, 2012. *Proposal for a new EU Environment Action Programme to 2020*. [Online] Available at: <http://ec.europa.eu/environment/newprg/index.htm> [Consultato il giorno 15 12 2012].
- EEA, 2002. *Towards an Urban Atlas, Assessment of Spatial Data on 25 European Cities and Urban Areas*, Copenhagen: European Environment Agency.
- Eisen, J. B., 1999. Brownfield policies for sustainable cities. *Duke Environ. Law Policy Forum*, 9(2), pp. 187-229.

English Partnerships, 2006. *The Brownfield Guide - A practitioner's guide to land reuse in England*, s.l.: English Partnerships - The National Regeneration Agency.

Estrella, M. & Gaventa, J., 2000. Who counts reality? Participatory Monitoring and Evaluation: a literature review. *IDS Working Paper*, Issue 70.

EU, 2011. *Thematic strategy for soil protection*. [Online]
Available at: http://europa.eu/legislation_summaries/agriculture/environment/l28181_en.htm
[Consultato il giorno 2013 01 17].

EUBRA, 2007. *European Brownfield Revitalisation Agenda*, D 73734 Esslingen: s.n.

European Commission, 2012. *Environment - Soil*. [Online]
Available at: <http://ec.europa.eu/environment/soil>
[Consultato il giorno 13 01 2013].

Ferber, R., 1974. *Handbook of Marketing Research*. New York: McGraw-Hill.

Ferber, U. et al., 2006. *Brownfields Handbook - Cross-disciplinary educational tool focused on the issue of brownfields regeneration*. s.l.:LIFELONG EDUCATIONAL PROJECT ON BROWNFIELDS.

Frantal, B., 2012. *Report on results of survey on brownfield regeneration and statistical analysis information*, s.l.: TIMBRE.

Freeman, R. E., 1984. *Strategic Management: A Stakeholder Approach*. 1st a cura di Boston: Pitman.

Freeman, T., 2006. Methodological issues in nursing research. 'Best practice' in focus group research: making sense of different views.. *J Adv Nurs*, 5(56), pp. 491-497.

Friedman, A. L. & Miles, S., 2006. *Stakeholders: Theory and Practice*. 1st a cura di New York: Oxford University Press.

Glicken, J., 2000. Getting stakeholder participation 'right': a discussion of the participatory processes and possible pitfalls. *Environmental Science and Policy*, Issue 3, pp. 305-310.

Grimble, R. & Chan, M.-K., 1995. Stakeholder analysis for natural resource management in developing countries. *Natural Resources Forum*, 19(2), pp. 113-124.

Grimski, D. & Ferber, U., 2001. Urban Brownfields in Europe. *Land Contamination & Reclamation*, 9(1), pp. 143-148.

Groenendijk, N., 2006. *Financing Techniques fro Brownfield Regeneration - A practical guide*, Netherlands: s.n.

Guimond, L. & Simard, M., 2010. Gentrification and neo-rural populations in the Québec countryside: Representations of various actors. *Journal of Rural Studies*, October, 26(4), pp. 449-464.

Hamilton, M. B., 2003. *Online Survey Response Rates and Times: Background and Guidance for Industry*, s.l.: Tercent, Inc..

- Hay, C., 1996. A State of Disarray? Huttonomics, New Labour and the Contemporary British Impasse. *Renewal*, 4(3), pp. 40-50.
- Heldman, K., 2009. *PMP Project Management Professional Exam Study Guide*. 5th ed. Indianapolis: Wiley Publishing Inc..
- Hersh, R. et al., 2010. *REUSE - Creating community-based brownfield redevelopment strategies*, s.l.: s.n.
- Höijer, B., 2008. Ontological Assumptions and Generalizations in Qualitative (Audience) Research. *European Journal of Communication*, 23(3), pp. 275-294.
- Hollander, J. B., Kirkwood, N. G. & Gold, J. L., 2010. *Principles of brownfield regeneration : clean up, design, and reuse of derelict land*. Washington(D.C.): ISLAND PRESS.
- Huston, S. A. & Hobson, E. H., 2008. Using focus groups to inform pharmacy research. *Research in Social and Administrative Pharmacy*, Issue 4, pp. 186-205.
- IFC, 2007. *Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets*, Washington: International Finance Corporation.
- Jolibert, C. & Wesselink, A., 2012. Research impacts and impact on research in biodiversity conservation: the influence of stakeholder engagement. *Environmental Science & Policy*, Issue 22, pp. 100-111.
- Jones, R. A. & Welsh, W. F., 2010. *Michigan Brownfield Redevelopment Innovation: Two Decades of Success*, Michigan: Eastern Michigan University.
- Kemeny, J. G., 1959. Mathematics without numbers. *Daedalus*, Issue 88, pp. 577-591.
- Kemeny, J. G. & Snell, J. L., 19. *Mathematical Models in the Social Sciences*. Boston: Ginn.
- Kirklees, 2008. *Research & Consultation Guidelines - Questionnaire*. [Online]
Available at: <http://www.kirklees.gov.uk/community/yoursay/Questionnaires.pdf>
[Consultato il giorno 27 12 2012].
- Lovbrand, E., 2011. Co-producing European climate science and policy: a cautionary note on the making of useful knowledge. *Science and public policy*, 38(3), pp. 225-236.
- Lynam, T. et al., 2007. A review of tools for incorporating community knowledge, preferences, and values into decision-making in natural resources management. *Ecology and Society*, 12(1).
- Morgan, D. L., 1996. Focus Groups. *Annual Review of Sociology*, Volume 22, pp. 129-152.
- Morgan, D. L., 1997. *Focus Groups as Qualitative Research*, Vol. 16. 2nd a cura di Thousand Oaks: Sage Publications.
- Nathanail, P., Thornton, G. & Millar, K., 2003. What's in a word: UK and international definitions of 'brownfield'. *Sustain*, 4(3).
- NCCSAP, 2005. *Stakeholder Engagement*. [Online]
Available at: <http://www.nccsap.net/documents/pdf/StakeholderEngagement.pdf>
[Consultato il giorno 20 12 2012].

- Ng, C. J., 2006. DESIGNING A QUESTIONNAIRE. *Malaysian Family Physician*, 1(1), pp. 32-35.
- NICOLE, B. W. G., 2011. *Environmental Liability Transfer in Europe: Divestment of Contaminated Land for Brownfield Regeneration*, s.l.: NICOLE.
- NOAA Coastal Services Center, 2009. *Social Science Tools for Coastal Programs. Introduction to Focus Groups*, s.l.: NOAA Coastal Services Center.
- NORISC, 2001. *NORISC Project Summary*. [Online]
Available at: <http://www.norisc.com>
[Consultato il giorno 2012 12 20].
- Oliver, L. et al., 2005. *The Scale and Nature of European Brownfields*, s.l.: CABERNET.
- Partridge, K., Jackson, C., Wheeler, D. & Zohar, A., 2005. *The Stakeholder Engagement Manual. Volume 1: The Guide to Practitioners' Perspectives on Stakeholder Engagement*, Cobourg: Stakeholder Research Associates Canada Inc..
- Pediaditi, K., Doick, K. J. & Moffat, A. J., 2010. Monitoring and evaluation practice for brownfield, regeneration to greenspace initiatives. A meta-evaluation of assessment and monitoring tools. *Landscape and Urban Planning*, Volume 97, pp. 22-36.
- Pielke Jr., R. A., 2007. *The Honest Broker: Making Sense of Science in Policy and Politics*. s.l.:Cambridge University Press.
- Rafson, H. J. & Rafson, R. N., 1999. *Brownfields - Redeveloping environmentally distressed properties*. 1 edition (June 14, 1999) a cura di s.l.:McGraw-Hill Professional.
- Reed, M. S., 2008. Stakeholder participation for environmental management: a literature review. *Biological conservation*, Issue 141, pp. 2417-2431.
- Reed, M. S. & Dougill, A. J., 2010. Linking degradation assessment to sustainable land management: A decision support system for Kalahari pastoralists. *Journal of Arid Environments*, 74(1), pp. 149-155.
- Reed, M. S., Fraser, E. D. G. & Dougill, A. J., 2006. An adaptative learning process for developing and applying sustainability indicators with local communities. *Ecological Economics*, Issue 59, pp. 406-418.
- Reed, M. S. et al., 2009. Who's in and why? A typology of stakeholder analysis methods for natural resource management. *Journal of Environmental Management*, Issue 90, pp. 1933-1949.
- Rennekamp, R. A. & Nall, M. A., 2003. *Using Focus Groups in Program Development and Evaluation*, Lexington: University of Kentucky - College of Agriculture.
- Renn, O., 2006. Participatory processes for designing environmental policies. *Land Use Policy*, Volume 23, pp. 34-43.
- RESCUE, 2005. *Best Practice Guidance for Sustainable Brownfield Regeneration*, s.l.: RESCUE.
- REVIT, 2007. *Working towards more effective and sustainable brownfield revitalisation policies. Stakeholder Engagement - A toolkit*, s.l.: s.n.

Richards, C., Blackstock, K. L. & Carter, C. E., 2004. *Practical Approaches to Participation SERG Policy Brief No.1*. Aberdeen: Macauley Land Use Research Institute.

Siebielec, G. et al., 2012. *Brownfield redevelopment as an alternative to greenfield consumption in urban development in Central Europe*, s.l.: G. Siebielec.

Smith, G., 2008. *Contributions of Brownfield Development to Urban Internal Expansion and Urban Renewal in Practice*. Dalian, China, s.n.

Starik, M., 1994. Essay by Mark Starik: The Toronto Conference: Reflections on Stakeholder Theory. *Business & Society*, 33(1), pp. 89-95.

Stoney, C. & Winstanley, D., 2001. Stakeholding: Confusion or Utopia? Mapping the Conceptual Terrain. *Journal of Management Studies*, 38(5), pp. 603-626.

Syms, P., 1994. The funding of developments on derelict and contaminated sites. In: R. Ball & A. C. Pratt, eds. *Industrial Property: Policy and Economic Development*. London: Routledge, p. pp. 63-82.

Syms, P., 1999. Redeveloping brownfield land: the decision-making process. *Journal of Property Investment and Finance*, 5(17), pp. 481-500.

Tarzia, V. (., 2003. *European common indicators. Towards a local sustainability profile*, s.l.: s.n.

TIMBRE, 2011. *TIMBRE – Tailored Improvement of Brownfield Regeneration in Europe*. [Online] Available at: <http://www.timbre-project.eu/> [Consultato il giorno 16 12 12].

Tippett, J., Handley, J. F. & Ravetz, J., 2007. Meeting the challenges of sustainable development - A conceptual appraisal of a new methodology for participatory ecological planning. *Progress in planning*, Issue 67, pp. 9-98.

Twigg, J. & Greig, B., 1999. *The Age of Accountability: Community involvement in disaster reduction*. s.l., UN-IDNDR and QUIPUNET Internet Conference.

URBACT, 2010. *Brownfield Integrated Governance (BRING) - Baseline Study - Development Phase*, s.l.: URBACT.

US EPA, 2009. *Soil Policy: Soil Contamination in Europe*, s.l.: EPA.

Vanheusden, B., 2007. Brownfield Redevelopment in the European Union. *Boston College Environmental Affairs Law Review*, 34(3), pp. 559-575.

Vanheusden, B., 2009. RESEARCH ARTICLE: Recent Developments in European Policy Regarding Brownfield Remediation. *Environmental Practice*, 11(04), pp. 256-262.

Weyer, M. V., 1996. UK: In an ideal world. *Management Today*, 01 September.

WHO, 1987. *How to organize an educational workshop*. [Online] Available at: http://whqlibdoc.who.int/publications/1987/924170635X_eng_Chapters5-7.pdf [Consultato il giorno 27 12 2012].

World Bank, 2010. *The Management of Brownfields Redevelopment. A Guidance Note*, s.l.: World Bank.

World Commission on Environment and Development (WCED, 1987. *Our Common Future*. Oxford: Oxford University Press.

Young, H. P., 1988. Condorcet's Theory of Voting. *American Political Science Review*, 82(2), pp. 1231-1244.

Young, H. P. & Levenglick, A., 1978. A Consistent Extension of Condorcet's Election Principle. *SIAM Journal on Applied Mathematics*, 35(2), pp. 285-300.

Yount, K. R., 2003. What Are Brownfields? Finding a Conceptual Definition. *Environmental Practice*, 5(1), pp. 25-33.

ANNEX I – Categories of information

Definition of the categories of information included in the latest version of the TIMBRE framework and developed in collaboration with the TIMBRE project partners.

Strategic planning: legal requirements, regional/urban land use plans as well as the interests of local government, zoning boards, planning agencies and environmental regulatory agencies are identified in order to ensure that all the plans requisites and restrictions are respected and to foster the success of the rehabilitation process. In this contest the identification and involvement of the relevant stakeholders is a key point since it ensures that their needs, visions for the area and interests are properly analysed and taken into consideration.

Investigation (preliminary/detailed): determination of site characteristics and definition of the extent and magnitude of contamination at a site.

Preliminary investigation concerns the identification of potential contamination according to information on of site history (i.e. maps, plans, photographs, geological and hydrological data, past owners/occupiers, industrial or commercial uses, raw materials, disposal of waste and any mining activities) and available sampling data.

Detailed investigation focuses on confirming whether any contamination exists at a site, locating any contamination, characterising the nature and extent of that contamination as well as defining the conceptual model of the site. It is essential to perform an appropriately detailed study of the site in order to identify the cause, nature, and extent of contamination and the possible threats to the environment or to any people living or working nearby.

Risk assessment (qualitative/quantitative): qualitative risk assessment allows to quickly identify potential risks, as well as assets and resources which are vulnerable to these risks. Qualitative risk assessment deals with the comparison of contaminant concentrations measured in soil, water or soil gas at a site with generic assessment criteria. Generic assessment criteria are typically conservative to ensure that they are applicable to the majority of sites and normally apply to only a limited number of pollutant linkages.

Quantitative risk assessment makes greater use of site-specific data to conduct a more accurate assessment of risks. Quantitative/detailed risk assessment involves the use of models to derive

site-specific assessment criteria that are then compared with measured concentrations in soil, water or soil gas at the site to estimate risk.

Remediation strategies and options: review and analysis of clean up alternatives. It is propaedeutic to the “Remediation technologies selection” because it aims to collect available information on possible strategies and options including the capability to meet specific clean up and redevelopment objectives, in accordance with legal requirements and regional/local planning and development goals.

Remediation technologies evaluation and selection: permits to evaluate various technologies in order to identify those technologies with the capability to meet specific clean-up and redevelopment objectives taking into account also the economic aspects (i.e. the most suitable remediation technologies for the specific site according to a specific budget). The review, analysis and selection of clean-up alternatives relies on the data collected during the site assessment, the investigation phases and the cost-benefit analysis.

Building and infrastructure documents: collection of documents for building planning, drawings and specifications needed to obtain building permits and to support the BF rehabilitation. These documents are used for tendering and to ensure that buildings are safe, healthy, accessible and sustainable from the environmental point of view.

Deconstruction/re-use of structures materials: deconstruction is the process of selectively and systematically disassembling buildings that would otherwise be demolished to generate a supply of materials suitable for reuse in the construction or rehabilitation of other structures.

Waste management: the collection, transport, processing or disposal, managing and monitoring of waste materials, mostly produced during the deconstruction of structures.

Requalification plan development: definition of a remediation technologies plan, which focuses on the application clean-up technologies to prepare the property for redevelopment and reuse. The design of the requalification plan and its implementation requires close coordination with all stakeholders.

Implementation, control, monitoring (land back to market): guarantee that the selected interventions are properly implemented, monitored and enforced in order to ensure the long-term durability, reliability and effectiveness of the interventions.

Socio-economic assessment: the socio-economic assessment aims at identifying the possible economic (business) implications of different alternatives for requalification of the site.

Funding and financing: the organisation responsible for the remediation process has to consider several strategies in order to provide funding and financial support to all the other processes and phases.

Decision-making and communication: decision making is the process of evaluating and ranking different scenarios (i.e., suitable solutions for the rehabilitation of contaminated sites) on the basis of different criteria such as for example future land uses, socioeconomic benefits, remediation costs, time span, environmental impacts, technology set/s (including train technologies) and residual risk. These aspects are usually evaluated by means of suitable indices.

ANNEX II – The questionnaire

Evaluation of TIMBRE Framework for the collection of available information on brownfield regeneration

Questionnaire for TIMBRE local stakeholders

Introduction

Since the second half of the 19th century, industrialisation and economic change have produced many brownfields (BFs) all over Europe.

In order to face the BF regeneration problem, several networks and projects have been developed. These projects have produced a large number of approaches and conceptual frameworks as well as manuals, decision support systems, guidelines, tools, etc., intended to produce a wide impact, but so far their practical use has been limited. In particular, many conceptual frameworks have been produced, but too often they don't comprehend all aspects of the BF regeneration process.

The European FP7 project timbre – Tailored Improvement for Brownfield Regeneration in Europe – (www.timbre-project.eu) aims to support end-users in providing customised problem and target-oriented approaches and management tools for BF reuse planning and remediation.

One of the results of the timbre project is the development of a target-oriented comprehensive framework for the collection of available information on BF regeneration. The process to develop the TIMBRE collection framework has taken into account the evaluations and integrations of the BF rehabilitation frameworks developed in previous projects and the inputs/suggestions concerning the framework information categories provided by the involved stakeholders. The framework for the collection of available information on BF regeneration is reported in Fig. 1.

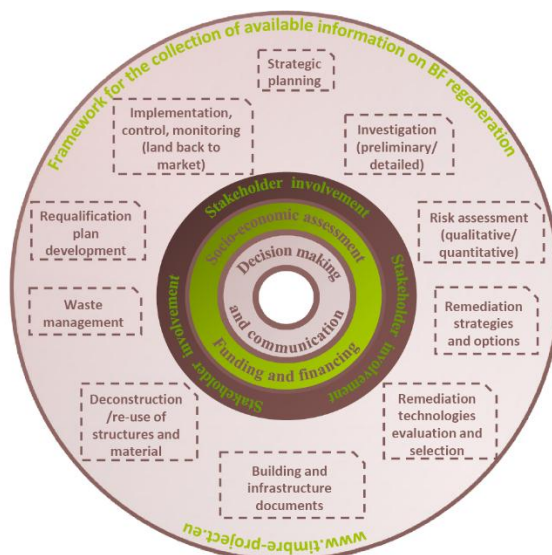


Fig. 1. TIMBRE framework for the collection of available information on BF regeneration.

Aim of the framework

The main objective of the timbre framework for the collection of available information on BF regeneration is strongly connected with the general aim of the TIMBRE project which is to provide tailored solutions to specific BF problems, through the analysis, classification and selection of tools, approaches, technologies, decision support systems, etc. developed in previous projects in order to stimulate their practical use.

The specific objectives of the TIMBRE framework for the collection of available information on BF regeneration are the following:

- a) supporting TIMBRE partners in collecting BF rehabilitation process information (regulations, conceptual frameworks, decision support systems, tools, methodologies, approaches, technologies, etc.) in order to make them available to stakeholders;
- b) supporting TIMBRE partners in the development of an expert system that will allow an easy access and an intuitive interface to find and collect relevant information for all partners, end users and stakeholders;
- c) to support the stakeholders involved in the BF rehabilitation process to find the needed relevant information for each phase of the BF rehabilitation process through the use of the timbre expert system.

Aim of the questionnaire

According to the growing importance of stakeholders' participation in BF regeneration, we deem that the involvement of stakeholders in the development of the above mentioned BF framework will be beneficial to improve the effectiveness and efficiency of the proposed collection tool and to reach a shared and agreed result.

In this context, your collaboration is very important and appreciated. Through the filling in of the following questionnaire we would like to collect your opinion on the proposed BF framework. The collected feedback and suggestions that you will provide during the participatory process will support us in the improvement of the framework and in the identification of missing important information categories.

A wide participation in the evaluation of the framework for the collection of available information on BF regeneration would be a winning condition for everyone since a high number of sources of information with different backgrounds have better chances to find new ideas and new solutions for the framework, and to identify possible gaps.

Moreover, participating in the evaluation of the framework will raise knowledge and awareness between all the actors involved in the brownfield regeneration process, as well as an increased credibility and legitimacy of the final result.

In conclusion, your participation can contribute to improve both the effectiveness and efficiency of the proposed framework for the collection of available information on BF regeneration developed within the timbre project.

Questionnaire

Part 1 - Profile of the respondent

Stakeholder name:

E-mail:

Phone:

Field of activity:

Organisation/Institution/Company:

Organisation/Institution/Company (English translation):

Select here the type of organisation:

- ☐ Public
- ☐ Private
- ☐ No-profit
- ☐ Research
- ☐ Other

Please indicate in which stakeholder category/categories you are included:

- ☐ Site owner
- ☐ Site neighbour
- ☐ Local authorities (town or city)
- ☐ Region and sub-regional government
- ☐ Regional and national regulator
- ☐ Local community group (neighbourhood, districts)
- ☐ Public interest group
- ☐ Developer/investor
- ☐ Technology provider
- ☐ Consultant
- ☐ Financier
- ☐ Contractor
- ☐ Insurer

☐End-use

☐Media

☐Scientific community and researcher

☐Other:

In which area of expertise would you classify your work activity? (more than one answer is possible):

☐Planning

☐Characterisation/Monitoring/Control

☐Risk Assessment

☐Remediation technologies

☐Decision-making process

☐Socio-economical aspects

☐Deconstruction and reuse of structures and materials/Waste management

☐Others:

Please, provide a brief description of your work in the field of brownfield regeneration including which is the main aim of your work. If at the moment you are not working on brownfield regeneration, please provide your past experiences in this field:

Could you indicate other stakeholders connected to or influenced by your activities within the brownfield regeneration process? Please select the stakeholders from the attached list:

☐Site owners

☐Site neighbours

☐Local authorities (town or city)

☐Region and sub-regional government

☐Regional and national regulators

☐Local community groups (neighbourhood, districts)

☐Public interest groups

☐Developers and investors

☐Technology providers

☐Consultants

☐Financiers

☐Contractors

☐Insurers

- ☐ End-user
- ☐ Media
- ☐ Scientific community and researchers
- ☐ Others

Part 2 – Brownfield perception

- 1) According to your work experiences and activities, could you provide us your own description of a brownfield site?

- 2) In your opinion, which and to what extent are the most significant concerns that the presence of a brownfield site can raise in the nearby territory and the surrounding community? Please, assign one value for each entry:
 - *Economic loss of the community (worsening of the overall business condition in the area with consequent reduced income of the local workers):*
☐ None ☐ Little ☐ Medium ☐ High ☐ Very high

 - *Loss of property value:*
☐ None ☐ Little ☐ Medium ☐ High ☐ Very high

 - *Keeping out potential investors:*
☐ None ☐ Little ☐ Medium ☐ High ☐ Very high

 - *Reduced local employment opportunities:*
☐ None ☐ Little ☐ Medium ☐ High ☐ Very high

 - *Housing abandonment (low desirability to live in the area due to negative appearance and low quality of the area):*
☐ None ☐ Little ☐ Medium ☐ High ☐ Very high

 - *Health risks (based on contamination and exposures):*
☐ None ☐ Little ☐ Medium ☐ High ☐ Very high

 - *Environmental pollution (Air and Water pollution, Ecosystem degradation, etc.):*
☐ None ☐ Little ☐ Medium ☐ High ☐ Very high

 - *Land consumption (utilisation of greenfield sites instead of brownfield):*
☐ None ☐ Little ☐ Medium ☐ High ☐ Very high

- *Urban blight (fostering of crime, vandalism, violence, and any other illegal activity):*
☐ None ☐ Little ☐ Medium ☐ High ☐ Very high
- *Other (please specify):*
☐ None ☐ Little ☐ Medium ☐ High ☐ Very high

3) From your point of view, to what extent is the regeneration of BF's important if it is to be weighed against the corresponding costs:

- ☐ I think it should be done only if the expected economic benefits from the future use of the revitalized site exceed the costs by a significant margin.
- ☐ I think it should be done even if the economic benefits are roughly equal to the costs because environmental and social benefits are evident.
- ☐ I think it should be done even if the economic benefits are lower than the costs because environmental and social benefits are evident.
- ☐ I think it should be done even if the economic benefits are either absent or highly uncertain because environmental and social benefits are evident.

Please, provide here below the motivation for the previous choice:

Part 3 – Evaluation of the framework for the collection of brownfield information

4) Based on your knowledge and according to the aforementioned main aim of your work and the information that you need to perform your work, provide an assessment of the proposed framework for the collection of available information on brownfield regeneration.

Please, follow the instructions:

- Please click the green checkmark to activate the categories of information on brownfield regeneration that you need for your work (to deactivate an activated box click the red cross);
- The activated categories of information will be included in the table below.
- Please give a number from 1 to n (n=number of selected categories of information) which indicates the sequential information order to reach the objective of the work (e.g. if the main objective of your work is to perform a risk assessment and the first category of information needed to reach the objective is related to the "Investigation" category, then it will gain the number 1; if the second required category is "Risk assessment", then it will gain number 2) in the "Category sequential information order" column.
- Since we would like to know which categories of the framework you consider the most important and critical for your work, please insert a score in the "Category relevance score" column in order to rank them from the most important (score 1) to the less important (score n, n=number of selected categories of information).
- If you need to add a specific comment on the selected categories of information you can use the "Comments" column of the table.
- Please use the "New category" functionality to add to the table a new information category which you think it is important for your work, but it is missing;
- To add general comments to the framework you can use text boxes.

Category of information	Category sequential information order	Category relevance score	Comments

- 5) Considering the categories and areas of expertise in which you are more involved with, do you have available documents about each of these categories? (e.g. regulations, guidelines, tools, case studies, etc.)

Yes ☐ No ☐

- 6) As stated above, the aim of the framework is to create the basis of an expert system that can collect and provide stakeholders with all the available information for the redevelopment of brownfields. Do you think that such an expert system could be helpful for you when dealing with the brownfield regeneration process? Please select only one option:

☐ Not helpful at all ☐ Not very helpful ☐ Moderately helpful ☐ Very helpful
☐ Extremely helpful

- 7) Would you use it?

Yes ☐ No ☐

please indicate here below your reasons referring, if possible, to your experiences in brownfield regeneration (e.g. difficulties in finding the necessary information).

- 8) In the future the expert system will be tested: could you be interested in being involved in its validation through an assessment of the information that it will make available to end users?

Yes ☐ No ☐

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