Interreg
Alpine Space
trAILs

Alpine Industrial Landscapes Transformation

Project Handbook

Partners and Pilot Sites

1. **Eisenerz**
   Steiermark/AT
2. **Borgo San Dalmazzo**
   Piemonte/IT
3. **L'Argentière-la-Bessée**
   Provence-Alpes-Côte d'Azur/FR
4. **Tržič**
   Gorenjska/SLO

Technische Universität München

TU WIEN raum simlab

Steirische Eisenstraße

84 Vaucluse c|a.u.e Conseil d'architecture, d'urbanisme et de l'environnement

Univerza v Ljubljani Biotehniška fakulteta

BSC Poslovno podporni center Kranj Regionalna razvojna agencija Gorenjske

zavod

UNIVERSITÀ di VERONA Dipartimento di SCIENZE UMANE

LAMORO AGENZIA DI SVILUPPO

POLITECNICO MILANO 1863 DIPARTIMENTO DI ARCHITETTURA E STUDI URBANI

0 50 100 Km

Base map: Interreg Alpine Space cooperation area

trAILs

PROJECT HANDBOOK

ALPINE INDUSTRIAL LANDSCAPES TRANSFORMATION

Contents

4 Introduction
6 Framework and approach

12 Pilots

30 Mapping
54 Assessment
104 Testing
124 Conclusions

132 Annex 1: Test designs
144 Annex 2: Learning module
150 Annex 3: Partner portraits

164 Picture credits

Interpretations of the seemingly worthless

PROF. DR. UDO WEILACHER

" When you look at it, it looks like any other piece of land. The sun shines on it like on any other part of the earth. And it's as though nothing had particularly changed in it. Like everything was the way it was thirty years ago. My father, rest his soul, could look at it and not notice anything out of place at all. Except maybe he'd ask why the plant's smokestack was still. Was there a strike or something? Yellow ore piled up in cone-shaped mounds, blast furnaces gleaming in the sun, rails, rails, and more rails, a locomotive with flatcars on the rails. In other words, an industry town. Only there were no people. Neither living nor dead. "

This excerpt from the science fiction novel "Roadside Picnic", written in 1971 by Boris and Arkady Strugatsky, describes a mysterious landscape of industrial ruins near Harmont, a fictitious city in Canada. The legendary film "Stalker" (1979) by Andrei Tarkovsky is based on this novel. The Stalker is a guide, helping foreigners to explore the strange brownfield site in search of miraculous and unique objects. The inhabitants of Harmont not only profit from brownfield tourism, but gain fascinating knowledge from their exploration of the area. In this fifty-year-old novel a wrecked industrial zone has an enormous potential for the future.

For many decades, it was common to either neglect brownfield areas and let them rot down or to dismantle all remnants of industrial use and create almost faceless clean areas. These strategies have changed in the recent, and it is not by chance that "Stalker" is often cited when searching for new interpretations of the seemingly worthless. It remains a challenge today in planning and design to activate the largely hidden economical, ecological and social potential of abandoned landscapes. Many of them are important reserves for development, especially against the background of globally increasing land consumption. Around the world we find a variety of successful industrial transformation projects in densely populated metropolitan areas. In Germany, the five-square-kilometre Ruhr area, populated by approximately 5 million people, is one of the best-known conversion projects, and the 230 hectares Landscape Park Duisburg-Nord is a pioneering example of an innovative transformation of a former steel mill.

It seems that sufficient knowledge has now been gained to solve complex transformation problems in post-industrial areas. However, this assumption is not quite right. Although each industrial production process, whether aluminium smelting, cement or steel production, is technically almost identical and requires the same infrastructure, the ecological, economic and social context of industrialization varies greatly from site to site. Every landscape, with its topography, its specific soil, water and climate conditions, has a most decisive influence on industrial development. The Alps are characterized by very specific natural conditions that have a direct and far-reaching impact on people's lives. It is therefore obvious that industrial conversion in this rather sparsely populated high mountain region has to follow different rules than in the densely populated lowlands of European metropolitan regions.

At first sight the Alps are often assumed to be a magnificent landscape, shaped by the forces of nature, used in suitable areas for agriculture and by tourists for various outdoor activities. Only the valleys seem to be partially characterized by settlements, commercial areas, motorways, railways and so on. This simplistic perception ignores the fact that the Alpine region is one of the largest industrial regions in central Europe, a very powerful landscape with a long history of exploitation of its natural resources, and heavy industrial activities. The Alps are a highly dynamic energy landscape, not only continually shaped by enormous geological energies, but also characterized by a high level of relief energy, which

figure 1: Landscape park Duisburg-Nord, Germany
figure 2: Brownfield in Leoben, Austria

intensifies all natural processes, from climate to erosion dynamics. Industries in the Alps had to take these energetic landscape characteristics into account from early on when constructing technical infrastructure and utilizing the natural resources, especially the omnipresent power of water. It would be grossly negligent to underestimate these inherent energies in the process of brownfield transformation, especially since global climate change is currently boosting energy levels and in so doing is significantly stimulating the dynamics of change in the Alpine landscape.

trAILs is about the transformation of Alpine Industrial Landscapes, AILS, striving to take the aforementioned specifics of a unique landscape as well as the Alpine way of life into account. We would like to introduce sustainable planning strategies that can be used by local and regional actors in Alpine regions when converting former industrial locations into good working and living environments. Such a complex task needs to take the local economic, ecological and social context into account and cannot be mastered by a single expert alone. We are therefore very pleased that, when initiating the project in 2017, we were joined by committed project partners in the regions and at renowned universities. The result of this successful team collaboration is presented in this publication, encouraging regional and local actors and stakeholders to get started and take the conversion of brownfield sites into their own hands. We would like to use this opportunity to thank all project partners, sponsors and friends for their invaluable contributions and their outstanding commitment over the years.

Framework and approach

MARCELLO MODICA, UDO WEILACHER

Due to the global structural change in industry since the late 1970s, the transformation of industrial brownfield sites represents one of the major challenges for the sustainable development of urban regions worldwide. Aiming to tackle the unprecedented land use change caused by the decline of traditional heavy industries, different planning strategies and tools have been developed and tested in recent decades. From the functional reconversion of vacant buildings and production spaces, also known as adaptive reuse, to the ecology-led conversion of polluted wastelands in post-industrial landscape parks, the issue of brownfield transformation has nowadays become an integral part of urban development plans and programs[1]. By contrast, peripheral urban and rural regions are rarely examined as a setting for brownfield redevelopment. These landscapes are characterized by scarce urbanization, long-lasting structural development problems and in many cases by highly dynamic natural change processes, driven by high relief energy and recently reinforced by the effects of global climate change.

The mono-structure of mountain industry, attached to specific locational factors and highly dependent on external conditions, is the main reason behind the continuous deindustrialisation over recent decades[2]. As soon as traditional heavy and manufacturing industries in mountainous areas were hit by the growing independence from raw materials and energy sources, and the global reorganization of industry, with the relocation of basic production chains in highly accessible locations or in developing countries, their inherent lack of resilience was dramatically revealed. In mountain areas in particular, the consequences of industrial decline have been severe and far-reaching for the general social, ecological and economic situation in recent decades. Not only did many people, often coming from small local communities, lose their jobs, left the region and added to a continuous depopulation of many inner valleys.

The closed down factories also pose an enormous problem to mountain regions from an environmental point of view. Due to the specific characteristics of the mountain environment, namely the relevant topographic constraints, the prevalence of extensive semi-natural open spaces and scattered urbanization, the decommissioning of industrial sites often generates extensive brownfield sites whose structural network reaches far beyond the core productive facilities and includes the complex system of supporting infrastructures and related functional spaces. It is most remarkable, for example, that most of the typical mountain industries were tightly connected to the complex local and regional water system.

From an economic point of view, a major problem of brownfield recycling in such economically marginal contexts is represented by the imbalance (real and perceived) between the amount of investment required for the entire transformation process and the uncertainty in terms of completion, achievements and returns. The high costs for the site preparation, including environmental remediation and built structures management (either demolition or preservation), are often burdening for small communities which lack adequate financial and contractual capacities. At the same time, the lack of vision and long-term strategies, or even the conflicts between these strategies and their feasibility, keep any potential private investor away from such operations. A further limitation is provided by the restricted range and scale of activities that can really be implemented on these sites, given the contextual conditions – low demand, few potential users, poor accessibility, and so on.

It is not surprising that the only successful reconversion projects in mountain areas are those related to the adaptive reuse of smaller sites, often less than 1 hectare, of local importance and projects related to the preservation of listed sites or buildings of historic interest, for example industrial

heritage sites[3]. Large-scale inner developments in major urban centres, where the pressure for land recycling is higher, also tend to be successful.

The Alps as laboratory

Located at the heart of Europe, at the crossroad of strong economic regions and dynamic metropolises, the Alps were pushed through a modernization process far earlier than other mountain ranges. This caused the emergence of the different forms and cycles of industrial development, leading the Alps to be one of the few existing mountain regions in the world characterized by a mature industrialization today [4]. In the current transition phase, the once historically relevant labour- and energy-intensive industry is experiencing a significant decline, while advanced tertiary activities are only developing in major urban centres and hub regions. This negative trend is clearly reflected in the shift in secondary sector employment from 50% to 36% between 1975 and 2000, and even further down to 18% by 2016, registered across the Alpine region[5]. Compared to the national averages of Alpine countries, these numbers show that in the Alps a slightly delayed but equally relevant deindustrialization process is occurring. Recent research[6] has identified 289 industrial sites in declining sectors, for example ferrous and non-ferrous metallurgy, the building materials, textile, chemical and paper industries, of which 142 have already closed or downsized – that is, actual and potential brownfield sites.

Given this scenario, it is reasonable to expect that in many Alpine areas the already significant amount of disused or underused industrial sites will tend to increase in the near future. Although not yet officially recognized at the regional planning and policy levels nor by the scientific community, the management of brownfield sites is becoming a crucial issue in the sustainable development of the Alpine region. Besides posing key challenges, the redevelopment of mountain brownfield sites provides several opportunities, in particular concerning:

- environmental regeneration: soil de-contamination from potentially hazardous waste, with expected positive effects beyond the site itself, e.g. in connection to rivers and groundwater, prevention of natural disasters, e.g. flood prevention and landslide protection, ecological compensation, e.g. soil de-sealing and improvement of disrupted ecological corridors;
- economic development: sustainable re-industrialization, e.g. making or reactivating space for small-scale business activities in green economy sectors linked to local nature-based production chains, innovation and research activities and business support centres and multi-seasonal tourism, e.g. in connection with cultural heritage valorization, artistic events, etc.;
- socio-cultural development: prevention of rural depopulation and social desertification, improvement and maintenance of local public services, protection of cultural identities.

The Alps are a relevant case study area not only because of their key position in the middle of Europe and their crucial importance to all six Alpine countries and their neighbours. This central European mountain region is, in fact, a unique socio-cultural complex integrated into a dynamic natural setting that is currently undergoing dramatic transformation under the influence of global climate change[7]. Many of the brownfield sites are located at strategic key positions in the region with regard to the future development of sustainable living environments on a local and regional scale. By carefully combining the solutions to the above mentioned three major challenges at different administrative levels, the

figure 1: Former Pechiney aluminium factory in L'Argentière-la Bessée
figure 2: Closed down Italcementi cement plant in Borgo San Dalmazzo

redevelopment of industrial brownfield sites will prove to be essential for the economic, ecological and social consolidation of the Alpine region.

Addressing complexity through cooperation
Considering the aforementioned challenges and opportunities related to the transformation of Alpine brownfield sites, this transformation seems to hold extraordinary relevance but also a great complexity for the local communities affected. The fact that the same challenge applies to the entire Alpine region in a very similar way, no matter the regional or site specificity, makes evident the need to develop new approaches based on territorial cooperation and knowledge exchange between science, practice and public administration. The Interreg Alpine Space project trAILs builds directly on these principles, putting them into practice in a highly multidisciplinary project partnership with an innovative and cooperation-based operative logic. The complex process of brownfield redevelopment requires the horizontal integration of different competencies, able to deal with the many different and often conflicting aspects of such a radical transformation of the built environment. In the specific context of the Alps and mountain regions in general, moreover, particular attention needs to be paid to landscape impacts, including both ecological and cultural aspects.

The project consortium was therefore constituted by five research partner institutions, each covering a specific thematic issue related to brownfield redevelopment. Landscape architecture and environmental sciences are

figure 3: Discussing the future of the site at a test-design workshop

covered by the Technical University of Munich through its Chair of Landscape Architecture and Industrial Landscapes (project initiator and lead) and the Chair of Restoration Ecology respectively. Urban planning, with a major focus on strategic planning, is covered by the Polytechnic University of Milan through its Department of Architecture and Urban Studies. Expertise in regional planning is provided by the Technical University of Vienna, through the Department of Spatial Planning. The necessary competencies in social and economic sciences are the responsibility of the University of Verona, and in particular the Department of Human Sciences and the Department of Economics. Landscape analysis and territorial cohesion policies are provided by the University of Ljubljana through its Department of Landscape Architecture. To this rich and diversified corpus of scientific expertise is added the valuable local know-how from four regional and local communities. The latter is identified according to their relevance as pilot areas for the entire Alpine region, as well as for their inherent cultural, geographical and economic diversity. Each community, represented by a regional development agency, joined the project by providing one brownfield site (pilot site) of local and regional relevance. The CAUE, Conseil d'Architecture, d'Urbanisme et de l'Environnement, of Vaucluse represents the south-western French Alpine regions and, in particular, the community of the Pays des Écrins in the Hautes-Alpes department, bringing to the project the Pechiney site, former aluminium smelter, in L'Argentière-la Bessée. The territorial development agency LAMORO represents the Maritime Alps region in south Piedmont (Italy), and in particular the community of

the Cuneo valleys with the former Italcementi cement plan in Borgo San Dalmazzo and Valdieri. The Verein Steirische Eisenstrasse, based in the historic iron mining and steelmaking region of Upper Styria (Austria), provides the Münichtal site, a former blast furnace plant in Eisenerz, as a pilot area for the project. The Business Support Center of Kranj represents the Gorenjska region in north-western Slovenia, and in particular the Tržič community with the former BPT textile mill.

The integration of scientific competencies and local knowledge is ensured by a strongly cooperative approach, in which the whole project consortium worked together proactively on all four pilot regions and sites with the same methodology and objectives. Using this strategy, the experts from the research institutes were called on to develop a multi-thematic approach to assessing the current situation and addressing the future development of the site, while the group of regional representatives provides the link to the local area in the form of stakeholder involvement and feedback. The innovative aspect of this operative logic can be found in the twofold level of engagement of the two groups of partners: a first level, which is common to such territorial cooperation projects, is related to the direct exchange of knowledge and experiences between different regions; a second level is that in which experts from different cultural and especially thematic backgrounds exchange ideas and integrate competences beyond their own territories.

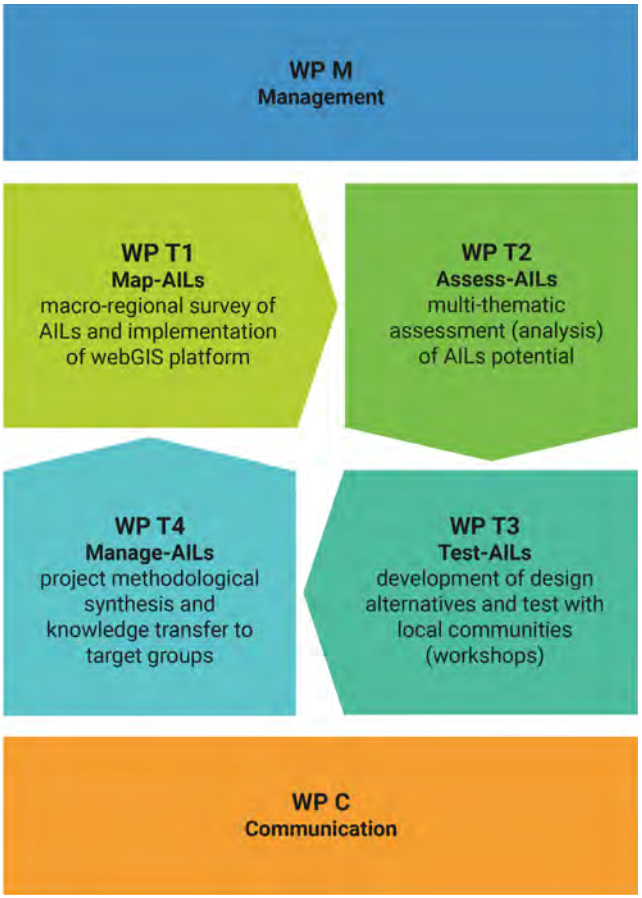
In addition, due to the "spatial" nature of the problem of brownfield transformation as well as to the form of required "planning-based" solutions, the approach developed introduces design as both a methodological and a communication tool. The proposed future transformation of all the sites, in fact, is first presented to stakeholders by means of test-designs, prefigurations of potential physical and functional layouts and then re-presented through alternative planning recommendations, resulting from the guided evaluation and synthesis by the representatives from the community. In this sense, landscape architectural design and planning are shifting from being solely an expert-oriented communication tool towards being a meaningful discussion base for a wider public with direct involvement.

The approach which was developed and employed is well explained in the following chapters, which follow the procedural organization of the project activities. In particular, the project was structured around four key work packages (WP). The first (Map AILs) focused on the implementation of an Alpine-wide database of brownfield sites, starting from the data available in the pilot regions and extending to other regions through the cooperation of project observers. The results were transferred into an interactive web GIS platform, covering the whole Alpine space, which rendered them visible.

The second and third work packages (Assess AILs and Test AILs) were based specifically on the four pilot sites and their regions. The second work package, in particular, focused on the development of a transferable, comprehensive and multi-thematic assessment methodology for Alpine brownfield sites, covering spatial, environmental, economic and sociocultural issues. The third work package, closely connected to the previous one, was dedicated to developing and implementing a design-based strategy to evaluate the future transformation of the site with the involvement of relevant stakeholders. To fulfil this aim, a workshop format was developed and tested in all the four regions. The fourth and last work package (Manage AILs) had to deal with the transfer of the knowledge generated in the project to end-users.

figure 4: Work packages (WP) scheme

The tools, formats and procedural schemes developed, as well as concrete recommendations, are integrated, systematized and distributed by means of a range of communication tools and activities, among which this project handbook stands out. Using this approach, the project aims to support local and regional stakeholders from mountain regions in the complex process of sustainable brownfield redevelopment.



Endnotes

1. Baum, Martina and Christiaanse, Kees: City as Loft. Adaptive Reuse as a Resource for Sustainable Urban Development. Zürich 2012. See also Braae, Ellen: Beauty Redeemed. Recycling Post-Industrial Landscapes. Basel 2015

2. Perlik, Manfred: The Spatial and Economic Transformation of Mountain Regions: Landscapes as Commodities. London 2019.

3. Lorenzetti, Luigi and Valsangiacomo, Nelly: Alpi E Patrimonio Industriale. Alpes Et Patrimoine Industriel. Alpen Und Industrielles Erbe. Mendrisio 2016.

4. Bätzing, Werner: Die Alpen – Geschichte Und Zukunft Einer Europäischen Kulturlandschaft. München 2015.

5. Sources: Alpine Convention, OECD, European Commission, FSO

6. Modica, Marcello: "Industrial Brownfield Sites in the Alps. A First Quantitative Overview and Potential Implications for Regional Development". In: Journal of Alpine Research | Revue de géographie alpine. 1, 107, 2019.

7. Grabherr, Georg, Gottfried, Michael and Pauli, Harald: "Climate Change Impacts in Alpine Environments". In: Geography Compass. 8, 4, 2010.

Pilots : :

14 Münichtal, Eisenerz, Austria

18 Italcementi, Borgo San Dalmazzo, Italy

22 AFP-Péchiney, L'Argentière-la Bessée, France

26 BPT factory, Tržič, Slovenia

Münichtal, Eisenerz, Austria

REGISTERED ASSOCIATION STYRIAN IRON ROUTE, VESTE

figure 1: Overview of Eisenerz, with the Münichtal site in the foreground and the Erzberg open cast mine in the background

Location and regional profile
The Styrian Iron Route comprises the western part of the region "Upper Styria East / Obersteiermark Ost" in Austria. The impressive "Erzberg" ("iron ore mountain") next to the town of Eisenerz with its spectacular open-cast mine is the region´s landmark and the cradle of Austria´s industrialisation. The region has a high proportion of forest areas (over 75%), with grassland use predominating in agricultural areas. The permanent settlement area is very low by comparison at 15 % (Styria: 30 %). Mountains rise up to 2.300 metres. The main settlement area is the Mur-Mürz valley with Leoben as the region´s capital. Here, there is a lack of building plots already, though dedicated land resources for industry and enterprises are still available. Beyond that, settlement is very sparse and dispersed and the loss of population, for example in the city of Eisenerz, the location of the pilot site, is immense.

The climate is cold and temperate, with a good deal of snow especially around Eisenerz. Natural hazards such as avalanches, floods and landslides occur regularly, and more and more sites are being declared danger zones, where building or industrial activities are prohibited. For the same reasons, the B115 state road leading across the Präbichl mountain pass to Eisenerz is frequently closed for several days in winter. The motorways A9 and S6/S36 and several railway lines connect Leoben directly in all directions with Austria´s major cities of Vienna, Graz, Salzburg, Linz & Klagenfurt. The closest airports are Graz and Vienna, which are approximately 45 to 90 minutes by car from Leoben.

Economically, the region is characterised by its mining history, which stretches back 1300 years and led to a highly specialized steel processing industry. The leading steel company voestalpine, which has 10.000 employees in Upper Styria, is located in the Mur-Mürz-Valley, 30 kilometres south of Eisenerz and the Erzberg mine. Outdoor and cultural tourism is relatively low key, but a growing economic niche. The Unique Selling Point (USP) of the region is "Industry in the middle of nature" ("Industrie im Grünen") – with easy access from the industrial centres to mountains, ski slopes, lakes, bicycle trails, rivers and so on. There is a full range of education on offer, with a focus on technical orientation (Mining University of Leoben, several technical colleges). In terms of Gross Domestic Product (GDP) per capita the district of Leoben is No. 2 in the Styrian ranking, preceded by Graz.

The population is stable in the central Mur-Mürz-Valley. Beyond that it has been decreasing rapidly. Eisenerz, a typical peripheral "shrinking city", is nowadays the "oldest" city in Austria with regard to age structure. In these peripheral parts, vacant properties are a major problem. This causes heavy financial problems for the municipality, as costs for maintaining the necessary technological infrastructure are extremely high. For this reason Eisenerz has developed a plan for downsizing the city and for finding new uses for vacant premises.

Pilot site: old blast furnace compound, Münichtal (Eisenerz)
The pilot site is located 5 kilometres north of the city centre of Eisenerz in the district of Münichtal. It is situated at an altitude of 730 metres in a narrow valley between the Eisenerzer Alps and Hochschwab. The surrounding mountains reach altitudes of approximately 2.200 meters and are densely forested. The site used to be the location of the old iron blast furnaces, processing the iron ore from the Erzberg mine. The first blast furnace was built in 1899/1900, to which a second one was added in 1911. To produce energy from hot furnace gas, a power station was added on the site in 1920-1923. The whole facility was shut down in 1945 and since then partially used as central workshops ("Hauptwerkstätte") for the Erbzerg mine. After the demolition of the old furnaces, Pilkington Automotive Austria constructed a new plant on the site in

figure 2: The Münichtal site in 1930
figure 3: Slag stored in the former power station

1984 to produce windshields. This activity ceased in turn, being replaced in 2010 by aluminium recycling by Alumelt and, later in 2012, scrap metal recycling by Primaras. In the northernmost corner of the site a slag heap from the blast furnace era can be found, which is partly contaminated.

The site has an extension of approximately 150.000 square metres. It includes a mix of old and new buildings, with a few century-old ones with moderate heritage value (e.g. the former power station), as well as used and unused spaces. The ownership is very fragmented (Raiffeisen Impuls Vermietungs GmbH, Primaras Handels GmbH, CCI Liegenschafts- und Verwaltungs GmbH, Sylvia Ebert, Hochofenschlacke Verwertungs GmbH). The site is directly connected to the railway system and accessible via the main road. Electricity, water and sewerage services are available. The surroundings are partially residential and partially forested. Adjacent in the north, just beyond the slag heap, is the old miners´ housing quarter of Münichtal. Most of this quarter was bought in 2015 by a private investor who is developing a tourist resort.

Challenges

Eisenerz has a century-long history of mining and industry. The preconditions, such as a strong industrial identity, skilled workers, Research&Development expertise at the mining university, the region´s thematic focus as a "materials cluster" from recycling to production, are assets that could be valuable in this context. The Münichtal site offers a range of opportunities for further development: Modern vacant factory halls of substantial size on the former blast furnace

figure 4: Overview of the Münichtal site from North-East. The slag heap is clearly visible on the right side

grounds as well as old remains and direct rail access. On the other hand, being not directly connected to the major highway network is a big disadvantage for the founding of new industrial companies, especially when road conditions in winter can be rough. A further drawback is the location of the Münichtal pilot site next to a settlement area, including a new tourist resort around 100 metres away. That means that any possible industrial use must be coordinated with the residents. In addition, demographic change has led to serious depopulation of the region around Eisenerz due to its location far from city life. In the longer term it could be quite a challenge to find good staff as so many people move away.

One particular challenge is the variety on the site: a mix of old and new infrastructure buildings which are more than 100 years old, next to modern industrial halls. There is the same variety in the quality of the buildings, a mix of used and unused buildings and different owners.

Expectations among the stakeholders varies: Owners of vacant buildings are mainly interested in renting or selling their property, which requires appropriate ideas for economical use. For the municipality, the creation of jobs and the active use of the site with corresponding payment of water and sewage services fees by site users are of high importance, as well as the impact of the site on the environment and on the tourist image of the city. For young people and locals, the creation of jobs and a low impact on neighbourhood areas are the most important challenges.

Italcementi, Borgo San Dalmazzo, Italy

LAMORO DEVELOPMENT AGENCY

figure 1: The Italcementi plant at the gateway of the Gesso valley towards the Po plain

Location and regional profile

The pilot region is located in the province of Cuneo, Piemonte region, north-western Italy. This area includes the municipality of Borgo San Dalmazzo and some small municipalities belonging to two distinct Alpine valleys, the Vermenagna and Gesso Valleys. The municipalities included in the pilot area and belong to the Vermenagna and Gesso Valleys, are Roccavione, Robilante, Roaschia, Valdieri, Vernante, Limone Piemonte and Entracque. Their total population is about 9.500 inhabitants. This territory is characterized by a configuration of small villages with a population density lower than the national level, an aged population and a weak level of migratory dynamism. A striking feature is the presence of numerous quarries and mines.

After the Second World War, the economy of the Gesso Valley underwent significant changes. The traditional activities such as agriculture and sheep farming gradually lost their importance, and a process of impoverishment was triggered which led to the depopulation of the valley. Various industrial activities settled in the area, including the quarries of Italcementi and Buzzi-Unicem as the presence of large masses of limestone and clayey shale has created a favorable environment for some cement factories to settle here. Tourism was relaunched in the 1980s.

The Gesso Valley is the core zone of the Nature Park of the Maritime Alps. The Park (about 29.000 hectares) is the largest protected area in Piedmont. The mountains are very high (the Argentera, 3.297 metres). It borders with its twin city of Mercantour (twinned since 1987) in the French National Park. Another important natural resource is the Natural Park of the Gesso and Stura rivers: it covers an area of 5.500 hectares, 70 kilometres of river and a population of over 120.000 inhabitants (14 municipalities), representing a connection between the valleys and the mountains.

In the Vermenagna Valley the economy is driven by winter tourism: Limone Piemonte is the main tourist centre in the west-southern Alps and offers more than 80 kilometres of cutting-edge slopes. Furthermore, beginning in the fifties, the valley has experienced a strong industrialization with the development of cement factories and quarries. Development in tourism and heavy industry have led to problems of both environmental and visual pollution which affected the quality of the landscape. Cement plants and traffic have repeatedly led to alarming levels of fine dust. In recent years the environmental condition of the valley has improved thanks to the closure of the Borgo San Dalmazzo cement plant and the modernisation of the Buzzi Unicem plant in Robilante.

Borgo San Dalmazzo has about 12.500 inhabitants and it is well known for snail farming. The municipality is settled at the end of a flat area and it is the starting point for several Alpine valleys: the Gesso Valley, Vermenagna Valley and Stura Valley.

Valdieri borders with Borgo San Dalmazzo and has about 1.000 inhabitants. Valdieri belongs to the Gesso Valley and is known for its thermal baths: hot sulphur water pours out of the mountain at about 1.400 metres of altitude and it is used in different ways to cure a large number of diseases. An international motorway (E74) connects Borgo San Dalmazzo to Nice (France) crossing the Vermenagna Valley and the Colle di Tenda tunnel (1.300 metres). From France there is another travel option for reaching Borgo San Dalmazzo crossing the Stura Valley (SS21) via the Maddalena Pass (1.996 metres) and the Lombarda Pass (2.351 metres). The Cuneo-Ventimiglia Railway connects the Alps to the sea via a wonderful journey from Piedmont to Liguria, through France.

figure 2: The cement plant active around 1960
figure 3: Field visit, 2018

The Pilot Site: the Italcementi cement factory
The pilot site is the cement plant owned by Italcementi and located in Borgo San Dalmazzo, which stopped producing cement in 2008. Some of the most important heavy industries in the province came into operation in Borgo San Dalmazzo after the Second World War. Mining was strongly linked to the construction and development of downstream plants and to the economic and social repercussions on the territory during the post-war economic recovery. The first established large-scale industry was the Italcementi cement plant in Borgo San Dalmazzo, whose construction began in 1941 and lasted until 1947, when it entered into operation. The plant used the dry process and had an overall capacity of 150.000 tonnes per year, upgraded to 450.000 tonnes per year by 1956. The energy for the production process was provided by two hydropower stations located in the upper valleys, built by Italcementi and now owned by ENEL. The raw material was extracted from two distinct quarrying sites: the Monte Cros limestone quarry, between Andonno and Valdieri centres, and the Terra Rossa clay shale quarry, in the Madonna Bruna district of Borgo San Dalmazzo.

The Monte Cros quarry, opened in 1950 to provide limestone to the cement plant, is located at 950 metres above sea level, near the Gesso river. The material was transported from the Monte Cros Quarry in Valdieri to the factory in Borgo San Dalmazzo by cableway, thus reducing truck traffic in the area. At present, the mining activities in Monte Cros are over. The Terra Rossa quarry provided schists for cement production, being also strongly related to the construction of the cement

figure 4: The disused cableway station (right) next to the furnace hall

factory. This quarry is no longer authorized.

For more than half a century, the Italcementi cement plant in Borgo San Dalmazzo was one of the most significant employers for the inhabitants of the valleys. In December 2008, the economic crisis and the obsolescence of the plant led the company to decide to stop the cement production lines, putting at risk many of the 97 jobs there at the time. Strikes, protests and interventions of various kinds prevented its closure. The plant was subsequently transformed into a grinding centre and the number of employees has drastically decreased from 97 in 2008 to 34 in 2015 and about 20 in 2019. Having now become only a grinding centre, in the second half of 2019 Buzzi-Unicem absorbed the workers who still worked in the Borgo San Dalmazzo plant, acquiring its economic activity. Italcementi, on the other hand, retained ownership of the infrastructure, but all industrial activities have definitively ceased.

The involvement of the stakeholders highlights how the cement factory is part of the history of the place, becoming a sort of icon. The connotations are both positive and negative: positive if considering the social and economic regeneration driven by heavy industry that characterised the post-war period, but also negative with regard to the environmental damage caused by the quarry areas and the negative repercussions on public health, wounds still open and painful.

AFP-Péchiney, L'Argentière-la Bessée, France

ARCHITECTURE, URBANISM AND ENVIRONMENT COUNCIL OF VAUCLUSE DEPARTMENT, CAUE

figure 1: Overview of the Pechiney site, along the Durance and towards the town centre of L'Argentière (in the background)

Location and regional profile
The L'Argentière-la Bessée brownfield pilot site is located in the upstream part of the upper Durance valley. This narrow valley is located in the high mountain sector of the Provence-Alpes-Côte d´Azur (PACA) Region, in FR821 according to the Nomenclature of Territorial Units for Statistics (NUTS) and at the northern end of the Department of Hautes-Alpes, close to the Italian border.

The Durance River is a historic traffic corridor between the Marseilles metropolitan region / Provence, and the Piedmont and French Alpine regions. The southern part of this axis crosses over 200 kilometres of the Provence Pre-Alps, a very sparsely populated rural area. The upper Durance valley is its upstream mountainous section. It rises along nearly 50 kilometres between Embrun (6.857 inhabitants) and Briançon (16.355 inhabitants) and gives access to mountain passes linking Turin and Grenoble conurbations. The only national road that serves the valley is subject to intense traffic causing nuisance and frequent traffic jams. Marseille and its airport are about 3 hours' drive from L'Argentière-la Bessée, Turin and its airport are 2 hours away and Grenoble is 2 and a half hours away. Main roads leading to Turin and Marseilles are located 1 hour from this town.

The department of Hautes-Alpes (5.500 square kilometres), more than 80% covered by forests and mountains, is a very sparsely populated rural area, with 141.000 inhabitants and a density of 23 inhabitants/square kilometres. It has very little heavy industry. The upper Durance Valley is one of the French Alpine valleys which experienced very significant industrial developments between the beginning of the 20th century, when "white coal" was discovered, and the 1970s/1980s. This southern part of the Alps, where some of the highest Alpine peaks culminate, is today a touristic region whose attractiveness is based on numerous ski resorts, vast protected natural mountain areas framing the valley (Ecrins National Park and Queyras Regional Natural Park) and the large artificial lake of Serre-Ponçon which holds the waters of the Durance below Embrun. The region enjoys a Mediterranean climate.

The Upper Durance Valley sector has about 40.000 inhabitants (42 communes). Its two population centres are Briançon and Embrun. Gap is located one hour downstream. Each of these small agglomerations is largely autonomous due to the strong presence of services catering to the tourist economy. L'Argentière-la Bessée (2.398 inhabitants) is the principle town of the Pays des Ecrins community of communes (CCPE) (6.904 inhabitants) which includes 7 more villages. This northern part of the department has been experiencing continued demographic growth since the 1980s, fuelled by the arrival of often retired households attracted by the quality of life in these mountains.

Pilot site: Péchiney former industrial site / "Les Sablonnières" activities zone
This brownfield site was once from the Péchiney aluminium plant created at the beginning of the 20th century. L'Argentière-la Bessée was created at that time to house the employees. This town is situated in a slight widening of the valley, on the banks of the Durance, at an altitude of about 970 metres and is dominated by high wooded slopes rising to over 2.500 metres. Another electrometallurgical industrial site, for calcium metal production, which is also currently a brownfield site (MGI brownfield), is located near the village of La Roche de Rame.

The first hydroelectric power station was built in 1907 and aluminium production started in 1910. The site expanded gradually and was taken over by the Péchiney company in 1945. In the 1970s and early 1980s the difficulties in

figure 2: The former water tower of the factory
figure 3: Inside the abandoned empty halls

maintaining aluminium production led to the closing of the plant in 1985, while Pechiney was taken over by the multinational Rio Tinto. In 1987/88 a steel foundry (AFP) was established on part of the site, while the rest was demolished and later urbanized. AFP closed in 2012. Between 2015 and 2019 the former industrial site (about 90.000 square metres) was opened to the town; as result, a large part of the former factory buildings was bought by CCPE and occupied by services and craft activities. The central part of the industrial site where AFP was located, remained a brownfield area until 2019, when it was acquired by CCPE with the aim of redeveloping the town and its economic activities in a sustainable manner.

The AFP brownfield has a surface area of around 20.000 square metres, located in the central part of the former industrial site, on the edge of one of the two main entrances to the town. Approximately 85% of this land is built-up, including the large heritage building of the former power station. The subsoil is certainly heavily polluted due to the former heavy industry. The roads within the old Péchiney site are linked to the urban road network. The passenger railway station is located next to the brownfield site. Water, electricity and sewerage services are available nearby. The industrial zone (Z.A.) les Sablonnières, located between the banks of the Durance and the town´s southern entrance, is adjacent to mixed-use district in the north. To the south, there is a renatured former slag heap, including the CCPE selective sorting centre and a cycle and footpath linking with the town's leisure and white water sports area.

figure 4: Partial overview of the site from the clock-tower hill

Challenges

The main challenges are strengthening the link with the town centre and the urban landscape which is of varying quality. When considering the AFP brownfield site, the challenges relate to the negative image that the site gives to the town. However, its strategic position as well as its central place in the Z.A. district, gives it the potential to provide structure for the whole town. The advantages at the scale of town and valley are related to the successful transformation of the image of the "black industrial city" into an attractive mountain town oriented towards valley tourism. These are based on the understanding of the Durance River as a central element of the valley, to be successfully rededicated for water sports and leisure activities, as well as for local industrial heritage. A further asset is the demographic dynamism which contributes to local economic dynamism, to the development of craft activities, and the presence of training institutions generating local trade jobs. With regard to the Sablonnières district and the AFP brownfield, the management of the land by the public domain and the good road network are an advantage.

The weakness in respect of town and valley is related to the ageing population, which makes it necessary to develop sectors generating long-term jobs and accessible housing opportunities. With regard to the Sablonnières district and the AFP brownfield site, there are strong concerns about underground pollution, the limited investment capacity of local public authorities and a certain fragmentation of land property which can make a coherent overall programme difficult.

BPT factory, Tržič, Slovenia

BSC, BUSINESS SUPPORT CENTRE L.T.D. KRANJ

figure 1: Overview of Tržič and the BPT site (middle) surrounded by the Karawanken mountains

Location and regional profile
The local community of Tržič lies in the north of the NUTS 3 Gorenjska statistical region in Slovenia, bordering Austria. The community covers 155,4 square kilometres or 0,8 % of the territory of the Republic of Slovenia and has 35 settlements with 15.851 inhabitants (2007). The centre of the local community is the town of Tržič, surrounded by the Karawanken mountain range to the north, while to the south there are more hilly areas and some flat land in the valley.

Tržič has a typical Alpine climate. 70 % is covered by forest, and there is typical Alpine agriculture in the valley and hills in particular. The mountains and hills in particular face avalanches in the winter, while in the valley floods and landslides occur during times of heavy rainfall. The Tržič region has good transport connections via roads toward Austria and the capital city, Ljubljana. In the vicinity is the national airport Jože Pučnik (Brnik). The inhabitants are well educated, but education facilities, except primary school, must in general be accessed in other cities, in the region and in the capital city Ljubljana.

The region and especially the town of Tržič have always been the centre of craft and industry in previous centuries and even today. Larger, traditional companies - factories producing shoes, metal objects, textiles, paper, furniture, were until 1990 an important generator of development and income in the local community of Tržič.

After Slovenia became independent in 1990, the market situation changed rapidly and many factories lost several markets. Slowly, some companies started to lose their competitive ability in the market and after years of changes in management and production many ended up in bankruptcy. Many former employees who had worked in these traditional factories started their own businesses and many of these are developing successfully, based on the knowledge and expertise obtained in the so called "lost factories".

The town of Tržič is surrounded by nature and the region has several protected areas (Natura 2000), especially in the Karawanks mountain range and Dolžanova gorge. For this reason, tourism has in recent years become a small but promising economic sector.

Pilot site: BPT factory and surroundings (Tržič)
The pilot site is located in the city of Tržič. The area of Bombažna Predilnica in Tkalnica (BPT), in English "cotton spinning and weaving mill", lies close to the old town of Tržič. The textile company BPT Tržič was established by the Swiss merchant Edmund Glanzmann and his Austrian partner Andrew Gassner at the end of 19th century. It began production back in 1886. Besides the production of textile the factory had its four hydroelectric power stations of its own.

In the years between 1922 and 1923 the factory employed 1.100 people and had 72 houses for workers. At the end of 20th century, due to loss of market and insufficient added value, BPT ceased to exist. The various limitations of the space meant that it took almost 20 years for the new company owner of BPT to plan the revitalization of the area, in effective cooperation with the local community of Tržič and other stakeholders. The local community of Tržič owns a small part of the area, where they are developing services that will contribute to a better quality of life in the city, for example by creating green areas.

The site itself is a combination of historic protected buildings, older buildings that are not protected, a power station, connecting roads and smaller green areas. The site is connected to the main road, that is in turn linked to the centre of Tržič and leads to villages in the surrounding area.

figure 2: The spinning mill in 1920
figure 3: The power station today

The site has a good connection with the roads that lead to Austria as well as towards the Slovenian national airport and capital city Ljubljana. Also, communal services and IT connections are available. The BPT area is bordered by the town centre of Tržič, with its residential districts as well as commercial and entrepreneurial districts. The town itself is surrounded by green areas, mostly forests and mountains.

Challenges

For the successful revitalization of BPT it is essential that the area reinforces its connections to the centre of Tržič. Since BPT is closely connected with the central part of Tržič, it shares certain supply sources, development activities and activities connected to quality of life and entrepreneurship. The site is a mixture of old buildings and structures which need general improvement, plus a power plant and green areas that need to be redesigned. The site represents a unique opportunity for redeveloping the entire city of Tržič. Due to its position almost in the centre of the city, there exists a very good opportunity for the redevelopment of the site, which can share entrepreneurial and public functions while contributing to the improvement of the quality of life of inhabitants living in the city.

figure 4: Shed halls

Additionally, innovative entrepreneurs can work with the site owners to find appropriate business premises, especially when certain parts of the buildings are renovated. Also, cultural heritage within the area represents an opportunity for good quality public and private programmes. As green areas are important for local quality of life, those already existing on the site must be maintained and improved. One important challenge is also to establish the right mix between private and public functions on the site. Another lies in how and in which way the site can develop and share certain functions with the centre of Tržič , where residential, retail and entrepreneurial functions dominate.

An important aspect of the revitalization programme is to take cooperation with the local community and other stakeholders fully into account. In the planning process, a joint consensus about redesign and redevelopment and new functions must be found. This may help to align expectations with the actual consequences of the transformation process.

Mapping : :

32 trAILs context

33 AILs survey

35 Database-supported webGIS platform

38 Technical structure/design (function)

42 trAILs platform (implementation)

44 Functional components

Mapping

JULIA FORSTER, MICHAEL RINNERTHALER, STEFAN BINDREITER

trAILs context

The localisation of Alpine industrial brownfield sites is an essential component in the discussion of the topic. The following chapter describes how the task was embedded in the project and how the mapping of Alpine brownfields was carried out in the course of the trAILs project. Work package 1, Map Alpine Industrial Landscapes, was defined to focus on data collection, data preparation and harmonization, as well as the presentation of data in the form of a database-supported webGIS platform. The objective of the work package was to develop a platform that can be used by public authorities on different scale levels, by sectoral agencies, as well as by universities and research institutions.

The work package is composed of three tasks. Task 1 provides the basic research, while Task 2 and Task 3 are closely related and in combination represent the content and technical implementation of the webGIS platform.

Task 1. Preparatory work on the pilot areas

The goal in the first task was to create a common framework for the operational phases in work packages 2 and 3 as preparatory work for the four pilot areas. For this purpose, the regional project partners used their local know-how to establish a local network of stakeholders in the respective pilot region. These networks were formed in order to ensure the active participation of local stakeholders during the core activities of the trAILs project, such as on-site visits, workshops and other meetings. In addition to the networking of local stakeholders, pilot profiles for the four pilot regions were also developed by the regional project partners in cooperation with the scientific partners and local stakeholders. Among other things, these profiles formed the working basis for work package 2 and in consequence for the assessments of the scientific partners. The pilot profiles contained information about the pilot region and the pilot site itself. For the regional profile, information on natural conditions and landscape, Alpine climate description, technical infrastructure and traffic, spatial structure and settlements, population and social infrastructure, economic situation, actors and networks were prepared. For the site profile, detailed information about the brownfield site itself was provided, such as the name of the pilot site, the brownfield surface, the status, the type of former industry, the ownership structure, etcetera. In order to obtain information about the current situation as well as an overview of future challenges and expectations, information was collected concerning current and future challenges in the region and the pilot site.

Task 2. AILs survey

The second task of the work package is the AILs survey. By means of the AILs survey, data from already existing national and regional data sources were collected by the project partners. The regional and scientific project partners contacted the respective authorities and requested the required data from them. If no data were available or if the data were not detailed enough, the project partners provided a template in which the content needed for the survey was defined. A more detailed description of the template can be found in the subchapter "AILs survey".

Task 3. Implementation of AILs GIS platform

While Task 2 ensured the content processing, Task 3 realized the technical implementation of the webGIS platform. The data generated in the AILs survey were harmonized, processed and subsequently stored in a database. Using this database, a webGIS platform was developed, which creates a visual representation of the data from the database using an interactive web map. A more detailed description can be found in the subchapter "Database."

AILs survey
The Alpine Industrial Landscape survey had the aim of bringing together already existing national and regional data sources on industrial brownfields in the countries of the pilot regions. At the same time, the aim was also to generate data for those areas where no brownfield survey had yet been conducted. These two objectives form the basis for the creation of a database of Alpine brownfields in the Alpine Space. In order to achieve this, the regional and scientific project partners established contact with the responsible authorities and provided them with predefined templates to make the data provision as easy as possible. A further goal of the AILs survey was therefore to create and provide a standardized template to define the minimum content for the creation of the database. This is particularly relevant for those areas for which data were/are not yet available.

Requirements
In order to ensure a standardized representation of the data across the whole Alpine space, it was initially necessary to define the requirements for the AILs survey. This required the definition of the formats in which the data can be made available. For this reason, the work package lead partner selected different file formats that all project partners should work with. This selection consisted of formats that are commonly used for processing georeferenced data in practice. These include shape files, Excel files, comma-separated-value files, GeoJSON[1] files and text files. In addition, PDF and Word have been defined as standard formats for reports in the context of work package 1.

In addition to the data formats, it was essential to develop a standardized template and a guideline for this template. The information needed to add a brownfield site to the database was determined in the design of the template. This information includes the name of the brownfield site, if available, to enable clear allocation, the coordinates in the format latitude/longitude to locate the respective brownfield site on the webGIS platform, as well as information on integration into administrative units, such as the municipality/region/state in which the brownfield site is situated.

In addition, the following attributes can be used to classify the brownfield sites:

- the type of former use/industry
- the surface area/size of the brownfield site
- information about the ownership structure
- information about the abandonment level

In order to achieve a standardized collection of data from the very beginning, guidelines were developed for the template, which should ensure a consistent data set for brownfields in the Alpine space in strict compliance with the specifications.

Survey data sources
The AILs survey constituted the starting point for the creation of the database, focusing on the four countries Austria, Italy, France and Slovenia where the four pilot regions are located. Because of differences in the administrative units and the diverging forms and qualities of data in the countries, different approaches were chosen for data generation.

Austria
In Austria, no mapping of Alpine brownfields is available on federal or regional level, which means that no existing data source could be used. In order to survey the brownfields in the pilot region within the framework of trAILs, the regional project partner carried out a survey in the NUTS3 regions of Liezen, Eastern Upper Styria and Western Upper Styria with the help of the local network, using the template. The data generated could then be entered into the database as the data set for Austria.

Italy
In Italy, during the trAILs project period, brownfield mapping for the Piedmont region was carried out independently of trAILs by Confindustria Piemonte. For the mapping within the AILs survey, the Italian regional partner selected the brownfields from this data set for the NUTS3 regions Torino, Cuneo and Alessandria. In order to facilitate further processing, the data surveyed by Confindustria Piemonte was processed and inserted into the template developed within trAILs.

France
In France, there is also no comprehensive survey of brownfield sites available. For this reason, the French regional partner carried out a survey in the NUTS2 regions Auvergne, Rhone-Alpes and the region Sud Provence-Alpes-Cote d'Azur. For this purpose a more detailed questionnaire was designed, which contains the initial contents of the template, supplemented with queries for further information. The data relevant to the database were then transferred to the standardized template.

Slovenia
Slovenia was the only country out of the four selected countries where an already existing data source from the Slovenian Research Agency could be used. In this context, it should be noted that Slovenia has a nationwide survey of brownfield sites in contrast to the other three countries in the AILs survey. Based on this data source, the Slovenian data set could be integrated into the template for the AILs survey by the Slovenian scientific partner.

Harmonisation of data/findings for the database
In order to provide a consistent dataset for the database, a review of the datasets created by the project partners within the framework of the AILs survey, to identify any discrepancies between them and to standardize them into a common dataset. After the survey was carried out in the four countries and their pilot regions, the data was transferred to the work package lead partner in the templates provided.

However, categories of the template were collected in different ways. It was therefore necessary to harmonise the data when preparing the data for the database. Determining the type of industry is one example for the necessity of data harmonisation. The exact industry types were collected in the questionnaire. In order to enable comparability, it was necessary to classify the industry types with regard to the database.

Another example is the ownership structure. In the survey, if the ownership structure was known, information about the currently prevailing ownership structure was entered as accurately as possible. In order to make them comparable across data sets, it was necessary to classify the ownership structure as well. In the case of ownership, four categories were created: public (including state and municipality); private; public, private (both) and no data.

figure 1: trAILs platform - pilot sites detail page

trAILs Alpine Industrial Landscapes Transformations

Pilot Region Austria / Obersteiermark Ost

General

Region

HISTORY The Styrian Iron Route (the western part of Östliche Obersteiermark) has a 1300 year history of mining. The Erzberg ("ore mountain") in Eisenerz, with its open cast iron ore mine, is one of the impressive remains of this history. Over the centuries, mining gave rise to a prosperous and still ongoing steel industry across the region of Östliche Obersteiermark and beyond (as far as Upper Austria and the upper Mur valley). The leading steel company, voestalpine, with 10,000 employees in the region and 50,000 worldwide, has its roots in Eisenerz (formerly the Alpine Montan Gesellschaft), and is centred in the Mur-Mürz Valley (between Judenberg, Zeitweg, Leoben, Kapfenberg and Mürzzuschlag). voestalpine has also brought other outstanding global industrial players such as AT&S and RHI in its wake. This region of mining and industry also created a classic industrial and mining culture in the "cradle of Austria's industrialization". Industrial monuments such as the extraordinary blast furnace museum Radwerk IV and the Erzbergbahn enjoy an international reputation. The mining university in Leoben is today one of the leading universities in international rankings. Apart from the Erzberg, the region offers rugged summit trails in the Eizenerzer Alps and the Hochschwab and gentle countryside in the Vordernberg valley, Palten-Liesing valley and around Mariazell. The city of Leoben, being the capital of Upper Styria, has developed a highly attractive young urban scene in recent decades. The Gösser brewery, with over 500 years of history, is also an important industrial ambassador for the region.

Erzberg

Open-cast iron ore mine, Source: TUM, 2019

Database-supported webGIS platform

The database-supported webGIS platform is the core element of work package 1. In order to provide an overview of the scope, the functionalities and implementation, the chapter is divided into several sub-chapters.

The first part explains the content and scope of the platform. This includes general geographic information about the pilot regions, information generated from the assessments by the scientific partners, and the results of the survey carried out within trAILs.

The technical structure and functionality are then laid out. In addition, terms relevant to the topic and to understanding the implementation of the platform are explained. With regard to this, an introduction to web mapping is given by explaining what geographical information systems are, the role of coordinates and coordinate systems in transnational data acquisition and web mapping, in which form geographical phenomena can be represented, as well as by which data types and services geodata can be made available and subsequently processed. After the basic concepts are explained, a short overview of the essential elements of web applications is given to aid understanding the architecture of web applications, such as server-side technology and client-side technology.

After this introduction to the basic terminology, the chapter is completed with a description of the technologies that were used to implement the trAILs-platform. Firstly, the technical

components, such as the architecture of the web platform, are explained and secondly the four components of the trAILs platform are presented. The most important component of the platform is the overview map for the visual representation of the data. In order to make the trAILs-platform easier to use, a selection and filter menu was provided on the one hand and a menu in which the basic map settings can be adjusted on the other. In order to make the data generated accessible beyond the end of the project, a download area was developed as the fourth component of the platform, permitting the sorting and filtering of the data and also providing the option of downloading the data in the form of an Excel file.

Contents of database and platform (scope)
The content of the database is divided into three elements:

1. Geodata (shape files): containing geographic information about the pilot regions
2. General information and insights generated during the assessments of the pilot regions by the scientific partners
3. Results of the Alpine Industrial Landscape Survey

The following sections present how the contents of the database were displayed, focusing on pilot sites and areas and the collected contents of the Alpine Industrial Landscape Survey.

Pilot sites and areas
The visual presentation of the information first of all focuses on information collected about the trAILs project region (Alpine Region), as well the four pilot sites Eisenerz (Steiermark), Borgo San Dalmazzo (Piemonte), L'Argentière-la Bessée/La-Roche-de-Rame (Provence-Alpes-Côte d'Azur) and Tržič (Gorenjska). In order to gain an overview of the different scale levels, three layers were defined. The regional layer displays information about the specific pilot region and the municipal layer about the specific municipality. The pilot site layer has the largest scope and contains information about the specific surveyed area. The available information is categorized as follows:

General Information
General information contains details about the history, natural conditions, traffic situation, demographics and further related information on the respective scale levels.

Assessments by the research partner
The analysis and consequent evaluations carried out by the scientific partners are presented on the three scale levels. The following topics are discussed:

Policy
On the regional level, information about regulations in the region and the country is provided.

Spatial
The spatial assessment provides analysis results of natural conditions, traffic, settlement patterns, technical infrastructure and further topics, according to their significance on one or on multiple levels.

Social
The social assessment presents the results of the demographic analysis, as well the analysis of local welfare at municipal level.

Economic
The economic assessment and related information about local economic welfare are also presented on the municipal level.

Environmental
The environmental assessment presents analysis results about nature conservation, environmental hazards, vegetation structure and further related topics.

Collected contents of the AILs survey
The second part of the visual presentation of information is concerned with the surveys, prepared and harmonised datasets from the AILs survey. The template developed within this survey, serves as the basis for this presentation. The collected information was sent to the project partners in the form of an Excel spreadsheet. Here, data was divided into two layers, or two levels of information. The first information layer contains basic data on the specific brownfield site, while the second information layer presents more in-depth-insights.

First information layer´s contents are as follows:

- Name of brownfield site; for example name of the previous company
- Coordinates (latitude/longitude); in order to localize the brownfield correctly
- Surface; in order to ensure comparability with other brownfields
- Municipality and region; administrative unit; responsibilities of public government
- Ownership; current ownerships structures of the brownfield site
- Abandonment level; degree of utilisation of the brownfield; to what percentage is the brownfield site already abandoned
- Type of industry; to which type of industry can the brownfield site attributed
- Pollution; information about contamination of the brownfield site

On the second information level, the following information is provided:

- Link; whenever available, a link to the owners of the property or to further, more detailed information about the brownfield site
- NUTS2 and NUTS3; incorporation into standardised regions on EU levels
- Building information; if there are buildings on the brownfield site, information about their condition can be provided
- Threats to the area; potential threats to the brownfield site
- Soil pollution; information about soil contamination
- Development plans; information about development plans
- Transport and utilities; connections to technical infrastructure:
  - Road infrastructure
  - Railway
  - Water system
  - Sewerage system
  - Supply system

table 1: Glossary of cartographic terms

Geoid	Hypothetical shape of the Earth, shaped only by gravitation and rotation
Geodetic reference system	Mathematical definition of a given representation of the Earth
Spheroid / Ellipsoid	The shape used within a given Geodetic Reference System
Spherical coordinate system	Description of a position on the spheroid
Projection	Transformation of the (3D) spherical coordinate system onto a 2D surface
Projected coordinate system	Coordinate system defined on a flat, two-dimensional surface with constant lengths, areas and angles
Map coordinates	Description of a position within a coordinate reference system

Technical structure/design (function)

Introduction to web mapping
The following is a brief explanation of essential terms that are necessary for a basic understanding of the solution presented. The topic of geographic information and cartography is only touched upon and not presented comprehensively.
The following sections present how the contents of the database were displayed, focusing on pilot sites and areas and the collected content of the Alpine Industrial Landscape survey.

Geographic Information System - GIS
A Geographic Information System is a system consisting of hardware, software and geodata. Geographic information systems allow the management and processing of vector, raster and factual data with spatial reference (= geodata), which is represented in the GIS via coordinates. In a broader sense, the spatial reference can also be established, for example, via street names and house numbers.

Coordinates/Coordinate Systems
A uniform system is required for the georeferencing of data. The geographical coordinate system permits the mapping of every point on Earth with two values based on the two fixed reference axes equator and prime meridian.

However, as the Earth is not a uniform sphere, geodetic reference systems act as approximation methods for correct mapping. In order to be able to display map contents and coordinates from geodetic reference systems, which approximate the shape of the Earth, on two-dimensional media (screen, paper), different projection methods are used. Depending on the purpose of the map, these can fulfil different quality criteria and, for example, offer the correct representation of angles and distances or areas. The best known projection is probably the Mercator projection[2].

This information is relevant for the web presentation, as the respective data reference system must be taken into account when storing the geodata in the database. By default, for the international exchange of geodata one expects the information to be provided in a geographical coordinate system. If this is not the case, the above information becomes relevant for the conversion or correct projection of the data. It is recommended that the data be converted into the uniform geographical coordinate system WGS 84 / EPSG 4326 in order to avoid additional transformation steps during any query and further processing of the data.

Geodata (vector/raster)
With a GIS it is possible to create and process geodata. Geodata are an abstract representation of real world objects and phenomena. Individual objects or phenomena of the real world are represented in GIS as features.

Features have stored geometry information and other properties. To achieve this, complexity must be sensibly simplified and reduced, so that the (geo)objects and properties relevant for the analyses can be stored in a database or table.

The object properties of a geo-object can be divided into geometrical, topological, thematic and temporal properties and supplemented with meta-information, for example author, data quality. A feature is an abstraction of a spatially assignable object to which further properties are linked.

Spatial phenomena can be represented conceptually in both a discrete and a continuous way, whereby the choice of representation should be made dependent on the desired level of detail and on further processing steps. The geodata are stored either as vector data, such as point, line and polygon, or raster data, such as pixel raster with a certain cell size. Vector data are usually used for clearly defined discrete phenomena, such as buildings and land, whereas raster data are particularly suitable for the representation of continuous phenomena, such as altitude model and temperature. Basically all phenomena can be represented somehow, either as raster data or as vector data, which of course has advantages and disadvantages.

Datasources and tools
Web mapping offers the option of providing dynamically different map contents individually for the respective user needs. At the same time, content from different sources can be merged. To ensure that this exchange is successful, there are uniform standards from the OGC[3] for the definition and transformation of different projections and coordinate systems, for data formats and also for the provision of this data on the web.

WMS
The Web Mapping Services protocol offers a standardized method for accessing maps on other servers. WMS servers can collect these different sources, reproject the map layers, if necessary, and send them back as a combined image containing all requested map layers. One server may offer a (topographic) base map, while other servers may offer aerial photographs or thematic layers via WMS and WMTS[4].

WMTS
The Web Mapping Tile Services (WMTS) protocol is based on a similar approach as the WMS protocol. The biggest difference between these two protocols is that a WMS query generates the output based on a query and is sent back in the form of a raster data. The WMTS protocol however, generates maps on the server and dissects these into smaller maps, which are called tiles. With a WMTS request it is possible to query individual tiles. This enhances the processing speed of the request [5].

WFS
In contrast to WMS and WMTS, which transmit data as raster information, the Web Feature Service protocol works directly with features that can be queried, updated, created or deleted[6].

For custom applications these services are mostly used to retrieve basic maps and aerial photographs, but there are also plenty of sources for thematic layers provided via these web services. The thematic content is either obtained from such an (external) web service or directly from a database by the custom server application.

In addition to mastering the technical challenges, the design aspect is also very important for web maps: easy to read online maps follow design principles[7] and usually consist of a basic map and focus on one or several thematic layers where the user can explore responsive map elements. Too many layers with too much content leads to overloaded presentations and makes the map difficult to comprehend.

Editing tools
The two most common GIS software packages are ESRI Arcmap and QGIS. ESRI Arcmap has been generally regarded as the industry standard for geographic information systems[8], its producer ESRI, is the provider of numerous general and custom GIS solutions worldwide. However, ESRI Arcmap is a proprietary system, and therefore not available for broader target groups. QGIS is an open source alternative with a large active development community. Both offer extensive features, detailed documentation and have different strengths and weaknesses. However, the underlying concepts are very similar[9].

While the editing of geodata is preferably done with the two GIS already mentioned, some geodata formats (e.g. GeoJSON) which are text based can be edited with simple tools such as source code editors (notepad++) or online tools such as http://geojson.io/.

Introduction to web applications
There are various options for completing web mapping projects. Almost every programming environment, coding language and server-side framework can be used to develop and implement web mapping tasks. It is important that both server- and client-side technologies are required. The necessary components are the programme code on the client side and the programme code and services running on the server side. The programme code on the client side is executed in the web browser. The communication between client side and the server happens via internet protocols, such as the Hypertext Transfer Protocol (HTTP).

Server-side technologies
The web server manages HTTP requests from web browsers and other user agents. The tasks range from the delivery of simple HTML pages to authentication tasks, Server-Side-Includes and the forwarding of requests to dynamic resources, such as CGI[10] applications and other server applications. The database is usually also a server application. All databases are based on (partly differing) data models. Independently of this they aim to enable the storage and management of data,

while avoiding duplicate storage. In addition, database systems allow plausibility and consistency checks and control over data security and data protection settings. Furthermore, applications and data can be developed independently of each other.

For several decades, the market has been dominated by the three major providers of relational database management systems (RDBMS): Oracle, IBM and Microsoft[11]. However, the current market dynamics have led to an upheaval which has triggered more extensive competition. Nevertheless, the relational databases offered by the three major suppliers are still leading the market.

Besides relational databases (table-oriented storage, standardised query language SQL - Structured Query Language), there are various other "noSQL" and "in-memory" database systems, with different storage concepts such as document-based databases (MongoDB) or distributed key-value pairs (Amazon DynamoDB, Apache Cassandra).

When it comes to choosing an open source relational database management system, both PostgreSQL and MySQL are time-proven solutions that can compete with enterprise solutions such as Oracle and SQL Server.

"A popular example for an open source spatial database is PostgreSQL with PostGIS. MySQL also implements some spatial features, although not as mature as PostGIS. The OGC Simple Features for SQL Specification is a standard geometry data model and operator set for spatial databases. Most spatial databases implement this OGC standard."[12]

"MySQL has been famous for its ease of use and speed, while PostgreSQL has many more advanced features, which is the reason that PostgreSQL is often described as an open-source version of Oracle." - PostgreSQL Tutorial. [13]

Both have extensions for geographic data types, methods and properties that allow them to be used as "spatial databases". These spatial databases are necessary whenever a web mapping application has to deal with frequently changing dynamic data or with huge amounts of geographic data. Spatial databases allow spatial queries, sub selects, reprojections and geometry manipulations, and offer various import and export formats.

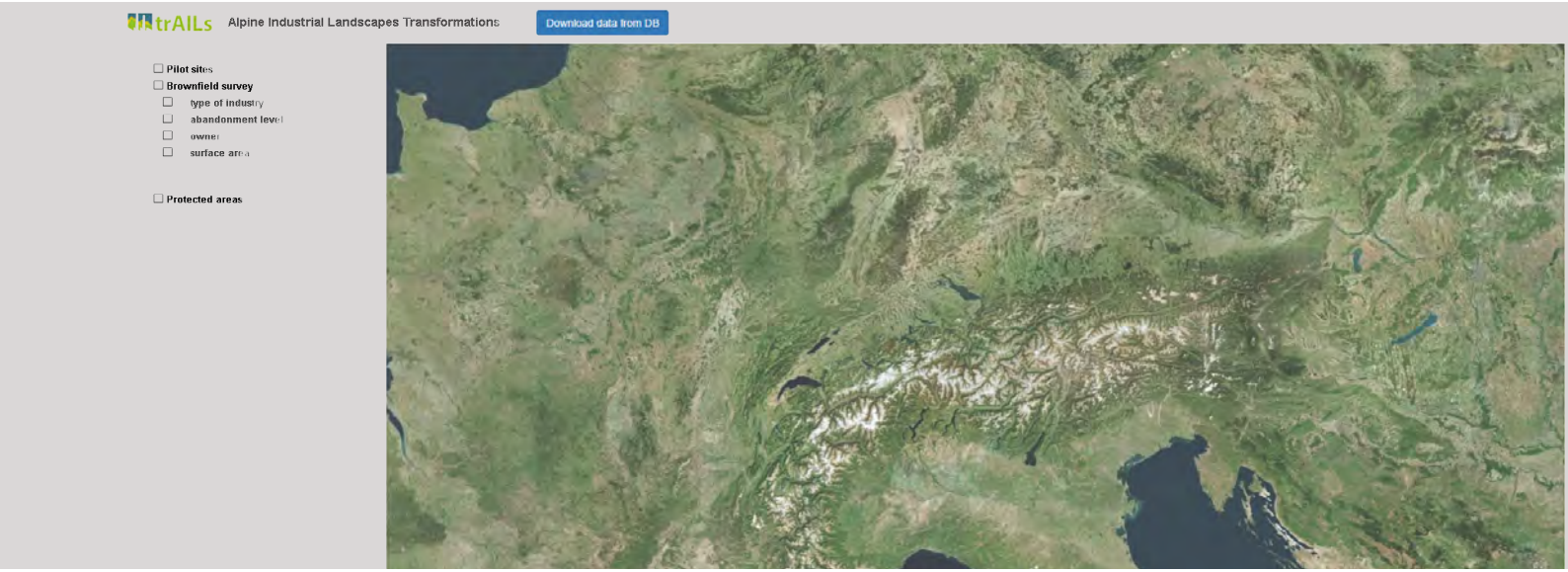
Client-side technologies
On the client side, in the simplest case all that is needed is a web browser that supports the display of HTML and raster images. To implement more sophisticated solutions, additional plugins can be included if necessary. ECMAScript is the standardized version of Javascript, which is part of all modern browsers. It is used to help perform, user interactions, refactoring of the DOM (Document Object Model) of a webpage and network queries. Several of these events are necessary to realize interactive client-side maps. The following three solutions are common JavasScript libraries for interactive web maps:

OpenLayers
is a two-dimensional open source Javascript library that enables the visualisation of geodata in the form of web maps. Mapping features can be included as (un)tiled raster layers, as well as vector layers[14].

Leaflet
As well as OpenLayers, Leaflet provides another two-dimensional open source Javascript library for the display of (un)tiled layers and vector layers in the form of interactive web maps[15].

CesiumJS
In contrast to the two Javascript libraries above, CesiumJS allows the three-dimensional visualisation of maps[16].

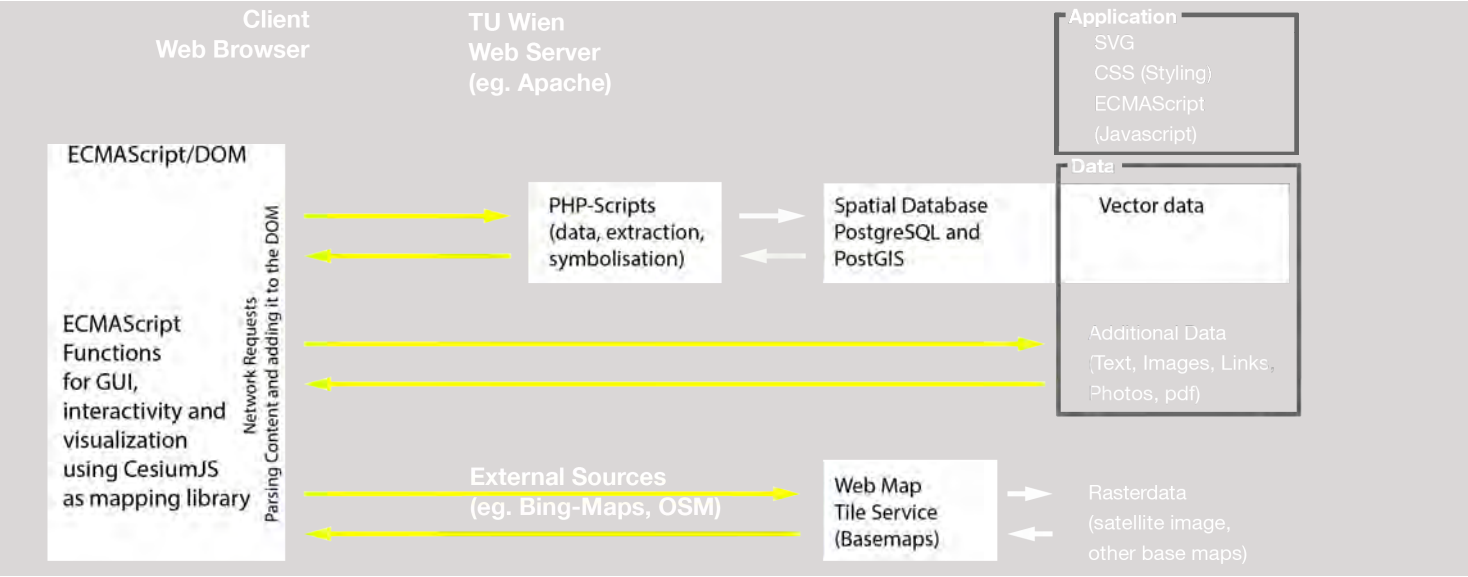
figure 2: trAILs platform



trAILs platform (implementation)
The database-supported web GIS platform provides a visual presentation of results generated within the AILs-surveys and assessments (WP 2) and enables a localisation of their content. The web GIS platform is made up of four segments. The most important segment of the platform is the web map, allowing users to visualise the content saved in the database. The second segment is the selection and filtering menu, enabling users to choose the content displayed in the web map. The more advanced menu with basic map settings is the third segment of the platform which contains assistance tools such as the map legend. In order to use the data outside the platform, the fourth segment provides a download area, where the content of the database can be accessed (figure 2).

Technical components of the database-supported webGIS platform
Figure 3 (page 43) illustrates the structure of the web map application within trAILs and provides an example for the basic structure of similar applications. It shows a client on the left, which is essentially a web browser loading and executing scripts, data and media from a web server on the right. On the web server more applications are installed that react to client requests and process the incoming requests in order to return website (and map) content. Additionally, they also include a programme logic that tells the client browser how to deal with the incoming data.

figure 3: Architecture of web application



Based on the existing server infrastructure of TU Wien, which hosts the web GIS platform, MySQL was selected as the database management system. The client side of the trAILs web application is constituted as displayed in figure 3, while on the server side structural adaptations of the PHP scripts were made to meet specific demands of the existing MySQL infrastructure. These PHP scripts carry out the preparation of client requests and facilitate communication with the database.

The MySQL database system used in this project does not allow the native processing of the GeoJSON format, therefore geometries are saved in the Well-Known-Text-Format[17] Consequently, workarounds were implemented within the PHP files that allow conversion between GeoJSON and Well-Known-Text. These are not necessary when using the database system PostgreSQL with the PostGIS-extension. Therefore, for future projects this alternative is recommended.

In order to allow three-dimensional cartographic visualisations of the pilot regions, consequently displaying the terrain (figure 4, page 46) around the pilot sites, the open source Javascript library CesiumJS was selected for development of the client side of the application.

Functional components
As shown in figure 2 (page 42), the trAILs platform consists of four main functional elements:
1. Overview map
2. Selection and filter menu
3. Basic map settings
4. Download area

1 Overview map
The first segment displays the overview map. In this all the data stored in the database are displayed in the visual form of an interactive web map. The map can display the three content categories of the database, namely general geographical information, data generated within the assessments, and the results of the AIL survey. These can be displayed both commonly and separately.

The pilot site information presentation displays general geographical information and data collected in the assessments. The information here is displayed on four detail layers. The smallest scale level (and detail level 0) covers the whole Alpine area and localises the four pilot regions. On the next scale level (detail level 1) the pilot regions are shown on a regional scale in the viewport. Additionally, whenever available, geographical information such as environmental protection areas in the pilot regions is featured. Information about the municipality of the pilot site on the communal scale is displayed in detail level 2. As above, whenever available, further geographic information in and around the pilot municipality is also included on this scale level. On the largest scale level (detail level 3) information about the pilot area and details of the brownfield site analysed is presented.

Additionally to the presentation of general information and the results of the assessments, the visualisation also displays the data from the AILs survey. In order to facilitate a clear overview of a large amount of data, overlapping datasets were clustered using CesiumJS (figure 6, page 47).
This clustering was conducted as follows:

1-9 brownfield sites are displayed with a marker, inclusively with the exact number
10-19 brownfield sites are displayed with a marker, with the number 10+
20 - 29 brownfield sitesare displayed with a marker, with the number 20+
30 - 39 brownfield sites are displayed with a marker, with the number 30+
40 - 49 brownfield sites are displayed with a marker, with the number 40+
50 and more brownfield sites are displayed with a marker, with the number 50+

This clustering enables a quick overview of the brownfield sites surveyed within a region. The clusters are dissolved into smaller clusters on zooming in. In order to get detailed information about a specific brownfield site, further zooming in may be necessary. As described in the chapter AILs survey, the dataset generated can be filtered according to specific attributes.

Visualisations on different detail levels permits the display of specific data according to the different scales. All detail levels contain general information, displayed in a pop-up that is opened when clicking on the information field. If further information is available for the selected area, the pop-up includes links to further insights in addition to the general findings. A distinction must be made here between results from the AILs survey and the content of the assessments. Detailed information from the assessments is generated by the project partners, while further details from the trAILs survey might refer to external information pages.

2 Selection and filter menu
The second segment of the web platform consists of the selection and filter menu. This menu enables the platform's users to display all, selected, or none of the information on the interactive web map. The two main categories of the filter menu are the information categories pilot site information and AILs survey, as described in the first segment.

Users can select whether all the information should be displayed or hidden, by checking a mark in the check-box for the category of pilot site.

The brownfield survey category, containing information from the trAILs survey, offers multiple options for filtering the datasets generated.

As above, the check-box must be checked to display the whole dataset at the beginning. Filtering of the dataset is performed using the following four predefined attributes:

Type of industry
The first filter category enables filtering of the AILs survey dataset according to the type of industry. Based on the inspection of the datasets the following seven types have been defined: textile, food, metalworking, wood, building materials, chemistry, and others.

Abandonment level
With the second category, brownfields can be filtered according to their abandonment levels. Possible filter criteria are listed as follows:

- total: corresponding to a 100 per cent abandonment level
- major: meaning that the brownfield is abandoned to more than 50 but less than 100 per cent
- partial: with an abandonment level of more than 10 but less than 50 per cent
- not abandoned: this category concludes industrial areas that will be abandoned at a given time in the future. Brownfield sites can also be assigned to this category if they might be deleted from the database due to successful re-utilisation or re-use.
- no data: if there were no data available about the abandonment level, the brownfield were assigned with the label no data.

Owner
Ownership structures constitute the third filter category. This category enables the selection of four attributes:

- public: the brownfield is owned by the public sector
- private: the brownfield is owned by a private proprietor
- public and private (both): the brownfield is owned partly by public and partly by private bodies
- no data: when no information about ownership structures is available

Area
The fourth filtering option corresponds to the surface area of the brownfields. The brownfield sites can be filtered according to the following five size classes: smaller than 1 ha, equal to or greater than 1 ha and smaller than 5 ha, equal to or greater than 5 ha and smaller than 10 ha, equal to or greater than 10 ha, as well as no data.

figure 4: JavaScript library CesiumJS - Terrain view of the Erzberg
figure 5: trAILs platform - pilot sites

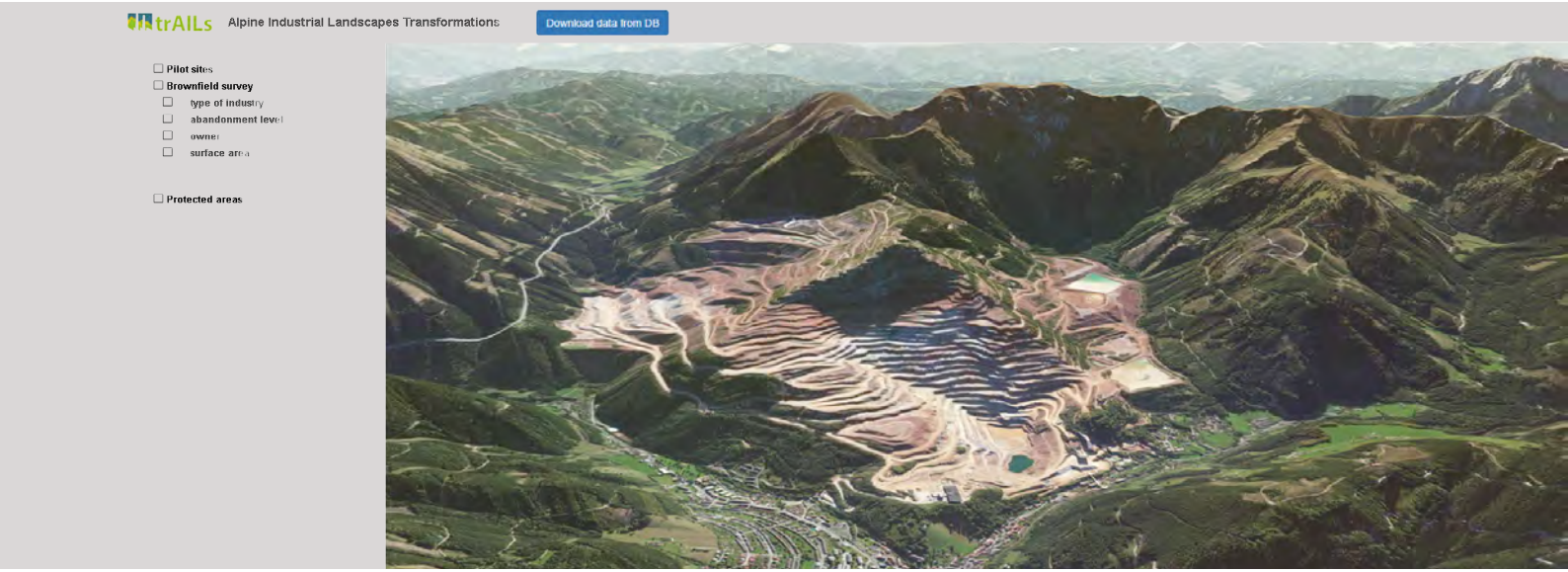
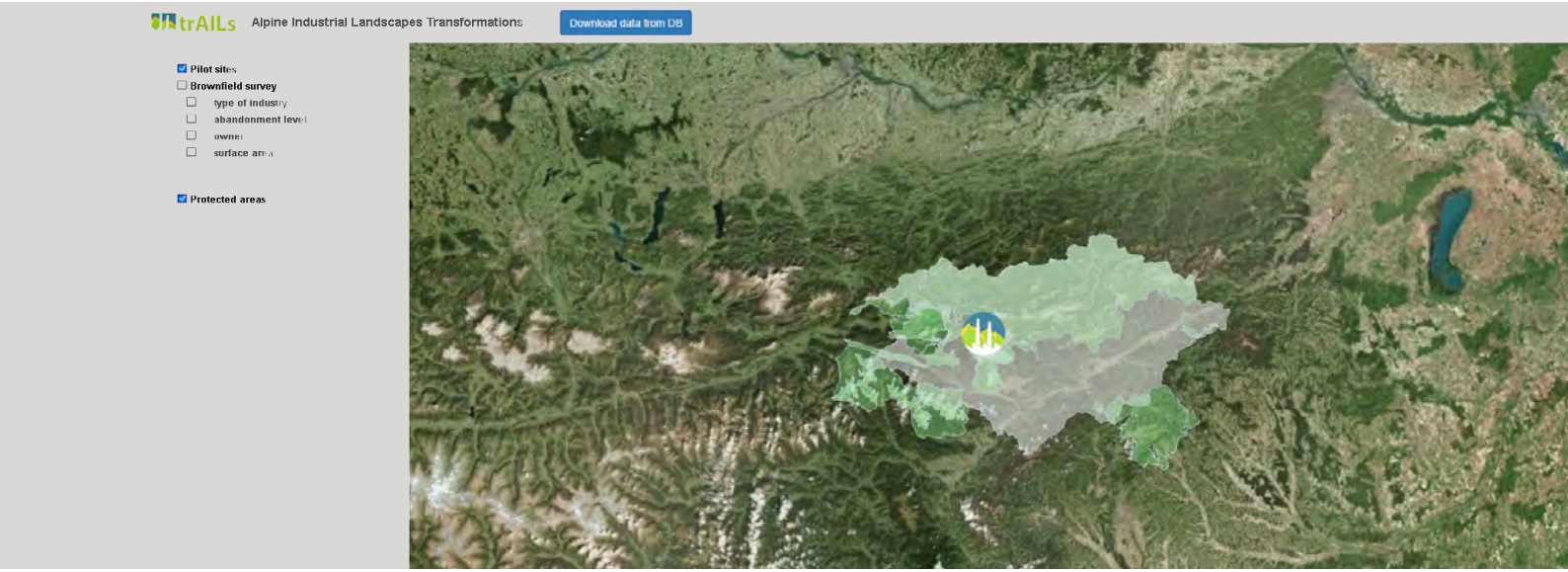


figure 6: trAILs platform - pilot sites regional scale
figure 7: trAILs platform - pilot sites municipality scale



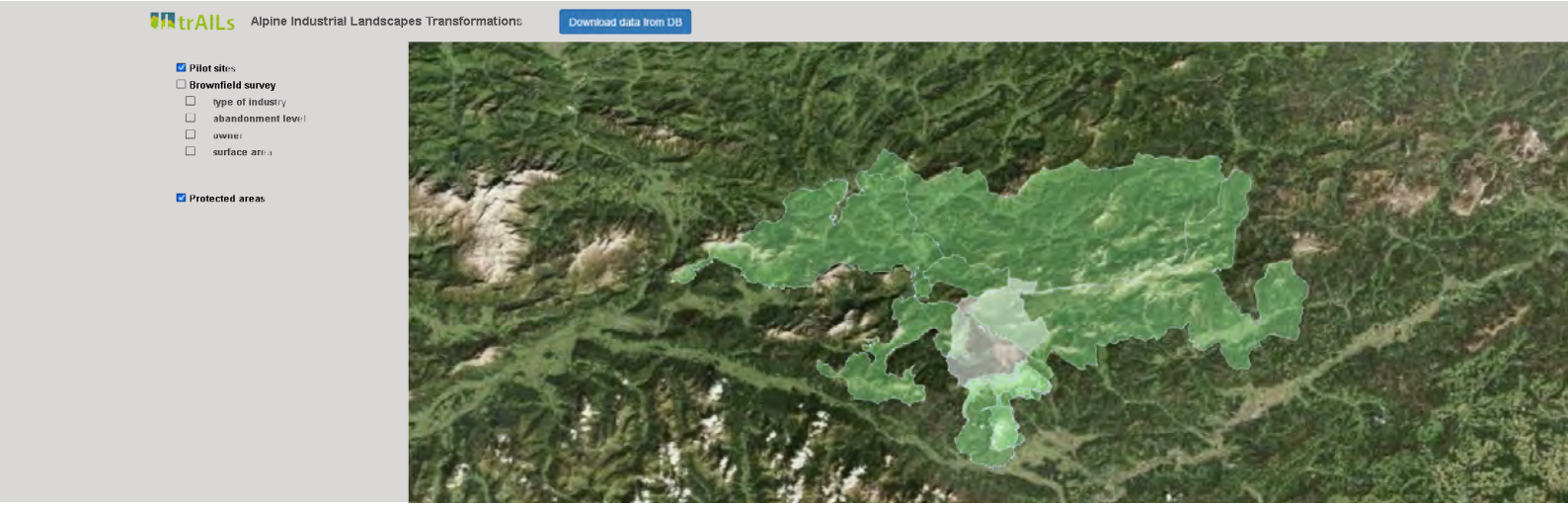
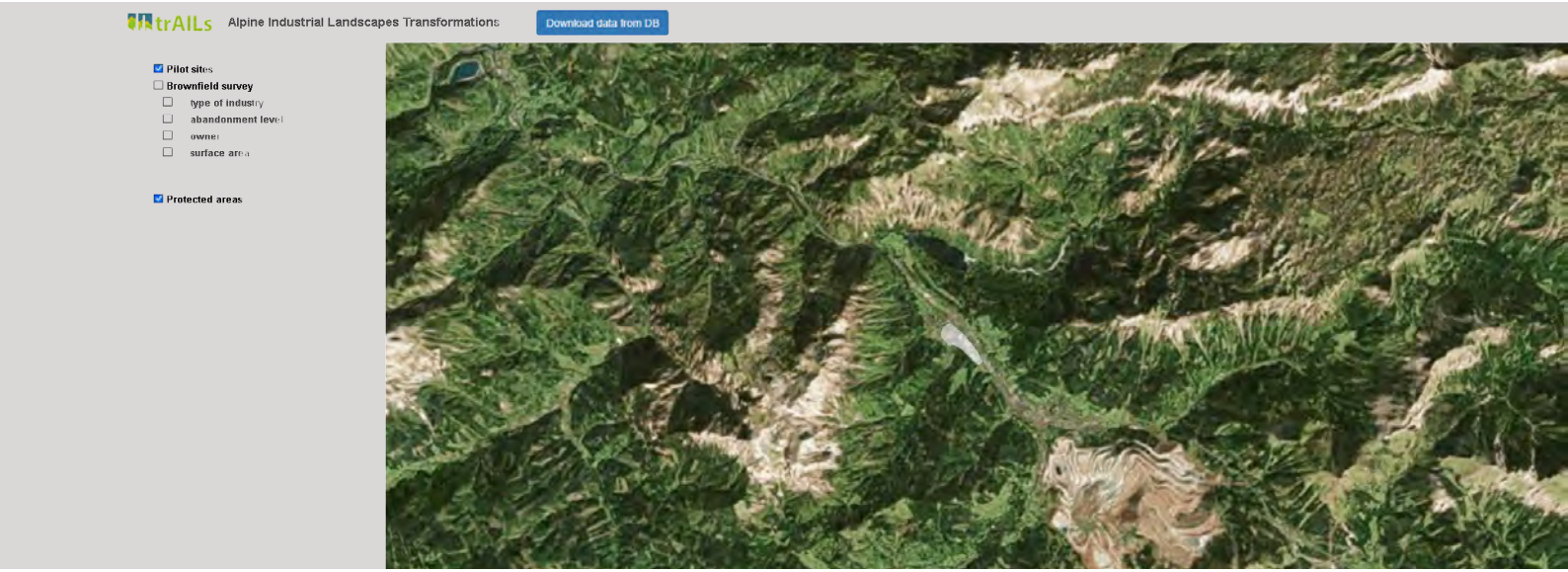


figure 8: trAILs platform - pilot sites scale
figure 9: trAILs platform - brownfield survey



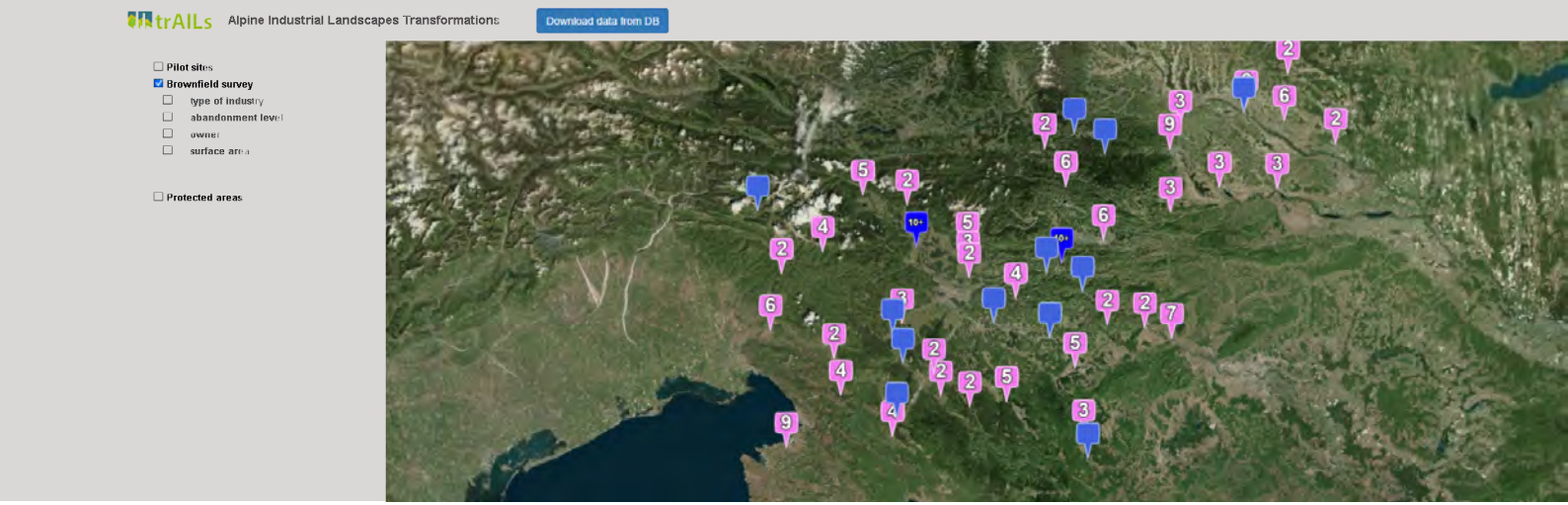
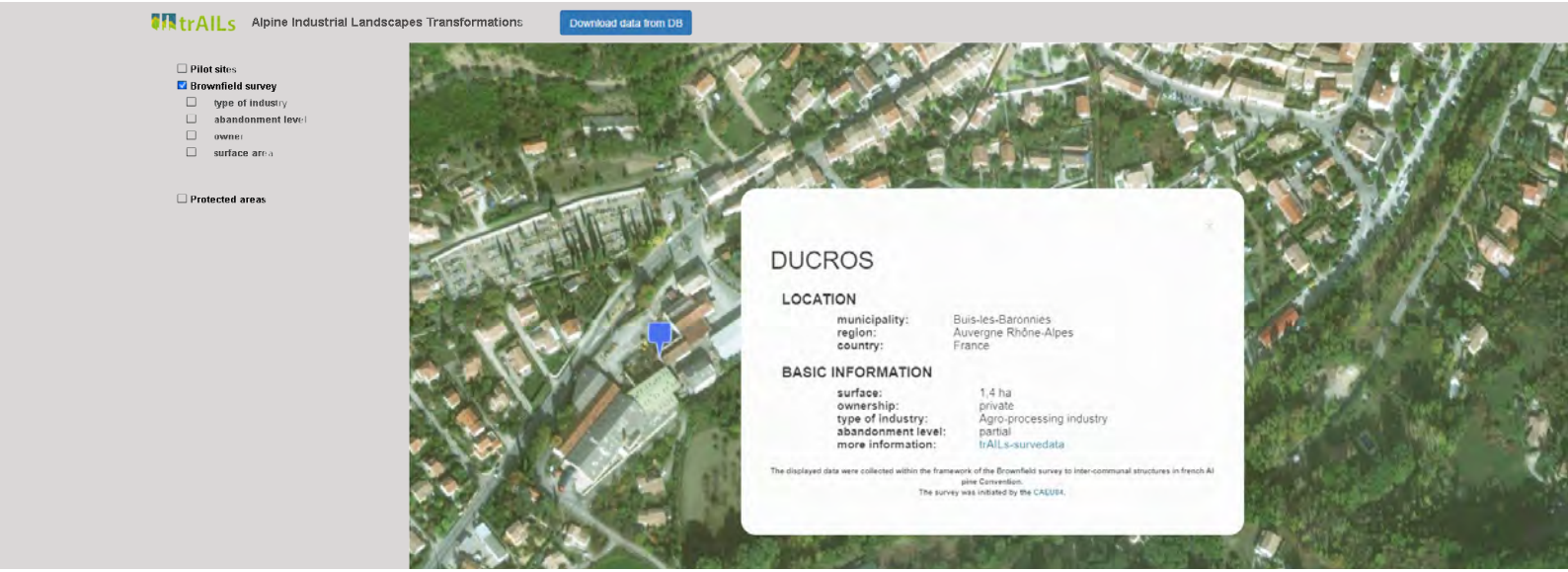


figure 10: trAILs platform - brownfield survey pop-up
figure 11: trAILs platform - brownfield survey detail page



trAILs Alpine Industrial Landscapes Transformations

DUCROS

location:	
municipality:	Buis-les-Baronnies
NUTS3:	Drôme
NUTS2:	Auvergne Rhône-Alpes
country:	France

type of industry:	
category:	Agro-processing industry
category cluster:	food

abandonment level:	
status:	partial
status survey:	Partiellement abandonné

building information:	
status:	undefined

development plans:	
status:	Non

ownership:	
status:	private

3 Basic map settings
The third segment of the web platform consists of the additional menu. This includes tools that improve the understandability of the platform and facilitate the usage of the web map. The additional menu tools are:

Legend
The legend displays an explanation of key terms for the platform's users, as well the symbols, lines, and areas used. Contents that are explained more in-depth are icons of the pilot sites or the representation of the results of the brownfield survey with the clustered pins. Filter options and related terminology are also explained here.

Centre button
With the centre button, users of the web platform can go back to the north-oriented map overview on detail level 0, from any given zoom level and orientation of the visualisation. The selected map layer is kept active.

Map layer
Three base maps can be selected from a dropdown menu:

- The default layer of the web platform is the Aerial View layer of the online mapping service Bing Maps from technology company Microsoft. This layer displays the surface of the Earth as aerial imagery[18].
- The second option is the Toner layer data visualisation and cartography design studio Stamen. This is a black and white layer with high contrast[19].
- The third option is the Standard layer OpenStreetMap. This layer displays generalised cartographic imagery, showing features with the same symbology across different countries[20].

4 Download area
The fourth segment of the web platform is the database download area. It can be accessed via the button "Download data from DB" and is displayed on a separate web page. The aim of the download area is to provide access to the database for external persons and consequently ensure usage of the database after completion of the project.

The functionality of the database download area includes accessing the datasets from the Alpine industrial landscape survey. Its contents can be filtered and sorted in a similar way to Segment 2, according to specific attributes. Possible examples for filtering or sorting scenarios are:

- The user wants to query all brownfields located in Slovenia, with an area equal to or greater than 1 and smaller than 5 ha, owned by a public body and assigned to the industry category " building materials".
- The users want to gain an overview of the number of datasets collecting brownfields of the industry category "wood processing". To achieve this, the dataset can be sorted alphabetically according to industry category assignment or filtered according to this attribute.

The filtered dataset can then be downloaded as an Excel file for further analysis or preparation.

In order to use the data outside the framework of trAILs, the following aspects need to be clarified:

Copyright
In order to ensure that datasets generated within trAILs, after the completion of the project, it is necessary to define a copyright for the data. One possibility is categorisation under the Creative Commons License. Variants of this license give the authors the option to define conditions under which the displayed data can be further processed or reused according to specific standards. Potential usage conditions range from naming the authors, to rights of modifications and to the regulation of commercial and non-commercial usage of the content. Besides this, consortium partners of the trAILs project can use the data according to the specifications set in their grant agreements[21].

Data maintenance/data management
In order to be able to ensure the continuity of the database beyond the end of the project, it must be clarified how data maintenance and data management is to be handled. Questions about future responsibilities and authorizations, (data) maintenance and servicing are closely linked to database access privileges.

The following questions must be answered clearly:

1. Is there a team responsible for data maintenance?
2. Who can add new brownfield sites to the database?
3. Who can modify existing datasets?
4. Who can delete datasets if a brownfield is reused?
5. Who can add/remove users and grant/revoke access rights?

Functions
To be able to maintain a database successfully, it is necessary to clarify access rights and to have a set of tools and functions that allow editing.

Login-mask
To allow only authorized persons to access the database. It needs to be defined who those people are.

Add
Tool which allows to add a brownfield site to be added to the database.

Change
Tool which allows modification of the data of a brownfield which already exists in the database.

Delete
Tool which allows to delete a record (brownfield) from the database.

Update/Feedback
Tool which allows users of the homepage to submit information to the database operators.

For these maintenance functionalities, a two-step system is proposed in which any addition, modification or deletion of brownfields needs to be approved by a user with clearance authority.

- For existing brownfield sites: further information, if any is missing; the possibility of notifying new uses and requesting that the brownfield site be removed from the database
- New brownfields: users can notify the database operators that there is a new brownfield site. Variant 1: User submits location data - DB operators check message themselves. Variant 2: User submits data himself, submitted data must contain at least Level 1 information

figure 12: trAILs platform - download area

Endnotes

1. geojson.org: GeoJSON, https://geojson.org/, 2020-10-20
2. More detailed explanations: https://www.esri.com/arcgis-blog/products/arcgis-pro/mapping/gcs_vs_pcs/
3. OGC a: "The Open Geospatial Consortium (OGC) is an international consortium of more than 500 businesses, government agencies, research organizations, and universities driven to make geospatial (location) information and services FAIR - Findable, Accessible, Interoperable, and Reusable." , About OGC; https://www.ogc.org/about, 2020-10-22
4. OGC b: Web Map Service, https://www.ogc.org/standards/wms, 2020-10-20
5. OGC c: OpenGIS Web Map Tile Service Implementation Standard, https://www.ogc.org/standards/wmts, 2020-10-20. See also: https://docs.qgis.org/2.14/en/docs/user_manual/working_with_ogc/ogc_client_support.html#wms-wmts-client, 2020-10-20
6. OGC d: Web Feature Service, https://www.ogc.org/standards/wfs, 2020-10-20
7. Wikipedia: Cartographic Design; https://en.wikipedia.org/wiki/Cartographic_design, 2020-10-20
8. Hleft, Miguel (2015). "You Can't Kill Jack Dangermond's Company. Try, And It Will Only Get Stronger."; https://www.forbes.com/sites/miguelhelft/2015/03/31/you-cant-kill-jack-dangermonds-company-try-and-it-will-only-get-stronger/#621f78195cd7, 2020-10-20
9. More information: Arcmap: https://desktop.arcgis.com/en/arcmap/ ; see also QGIS: https://qgis.org/ ; and Arcmap vs. QGIS: https://www.researchgate.net/publication/330601009_Evaluating_the_parameters_of_ArcGIS_and_QGIS_for_GIS_Applications, 2020-10-20

10. CGI - "A CGI application implements the common gateway interface protocol, processes the information sent by the client, does whatever the application should do and sends the result back in a web-readable form to the client." - Neumann 2017: 2495w

11. Mullins, Craig S (2017): Überblick über die führenden operationalen Datenbanksysteme; https://www.computerweekly.com/de/ratgeber/Ueberblick-ueber-die-fuehrenden-operationalen-Datenbanksysteme, 2020-10-21

12. Neumann, Andreas (2017): Web Mapping and Web Cartography. In: Shekhar, Shashi; Xiong, Hui; Zhou, Xun (eds) Encyclopedia of GIS. Springer, Cham.

13. PostgreSQL Tutorial: PostgreSQL vs. MySQL; https://www.postgresqltutorial.com/postgresql-vs-mysql/, 2020-10-20

14. More detailed explanations: https://openlayers.org/, 2020-10-20

15. More detailed explanations: https://leafletjs.com/, 2020-10-20

16. More detailed explanations: https://cesium.com/cesiumjs/, 2020-10-20

17. OGC e: Well-known text representation of coordinate reference systems, https://www.ogc.org/standards/wkt-crs, 2020-10-20

18. More detailed explanations: https://www.bingmapsportal.com/, 2020-10-20

19. More detailed explanations: https://hi.stamen.com/dotspottings-toner-cartography-avail-able-for-download-1f652eb25f38, 2020-10-20

20. More detailed explanations: https://wiki.openstreetmap.org/wiki/Standard_tile_layer, 2020-10-20

21. More detailed explanations: https://creativecommons.org/about/cclicenses/, 2020-10-20

Assessment ::

56 The AILs: assessment procedure

62 Policy assessment

70 Spatial and functional assessment

78 Socioeconomic assessment

86 Environmental assessment

94 Developed tools

The AILs: assessment procedure

TOMAŽ PIPAN, MANCA KROŠELJ

Methodological introduction

The second work package (WP T2) developed and tested assessment procedures for the comprehensive assessment of AILs by actively working on the 4 pilot sites. For each of the pilots, research project partners (PP) supported by regional PPs assessed key-aspects such as current spatial and landscape features, cultural value, environmental and economic conditions, socio-demographic context and regional and local policies for brownfield regeneration. This process included intensive fieldwork and generated an assessment tool as its main output (figure 1, page 57).

Co-assessment (figure 2, page 58) is the central part of WP T2. It is a parallel process of 5 different assessments – social, economic, spatial, environmental, policy – of AILs by the research PPs supported by the regional PPs. Based on the learning by doing approach, four pilot areas were used to test and adjust each assessment method for local specificity by streamlining the types and content of the analyses. The final methods then were used for the Assessment Synthesis (A.T2.3) and the Assessment Tool (O.T2.1).

Another input for the co-assessment came from WP T1 results and input of knowledge collected and analysed throughout the four site visits to the selected pilot areas. In the co-assessment activity, attention was also given to the input of existing policies on different levels, such as local, regional, national and supranational.

The assessment of AILs had two goals:

- Firstly, the results of the assessment were fed into the WP T3 co-development workshops
- Secondly, assessment of the methods informed the modification of methods for the next pilot site and production of the Assessment Tool (WPT2 output).

To facilitate these two goals, "reflection sessions" were created as part of the site visits. For the first goal, we looked at assessment outputs and how they informed WP T3. For the second goal, we discussed the assessment of methods, which is the reflection on the methods, analyses, indicators, tools and formats, in order to bring them together into one cohesive tool. Based on the learning by doing approach, the assessment methods were jointly discussed in an evolving manner in order to streamline them and find the most important aspects of each for the final output of the WPT2.

For the purposes of managing all of the assessment activities, the WPT2 used a number of methodological approaches and tools, explained in depth in the last chapter. These were the site visit and the reflection sessions, assessment poster and the assessment cards, assessment booklets for each site and the final assessment tool.

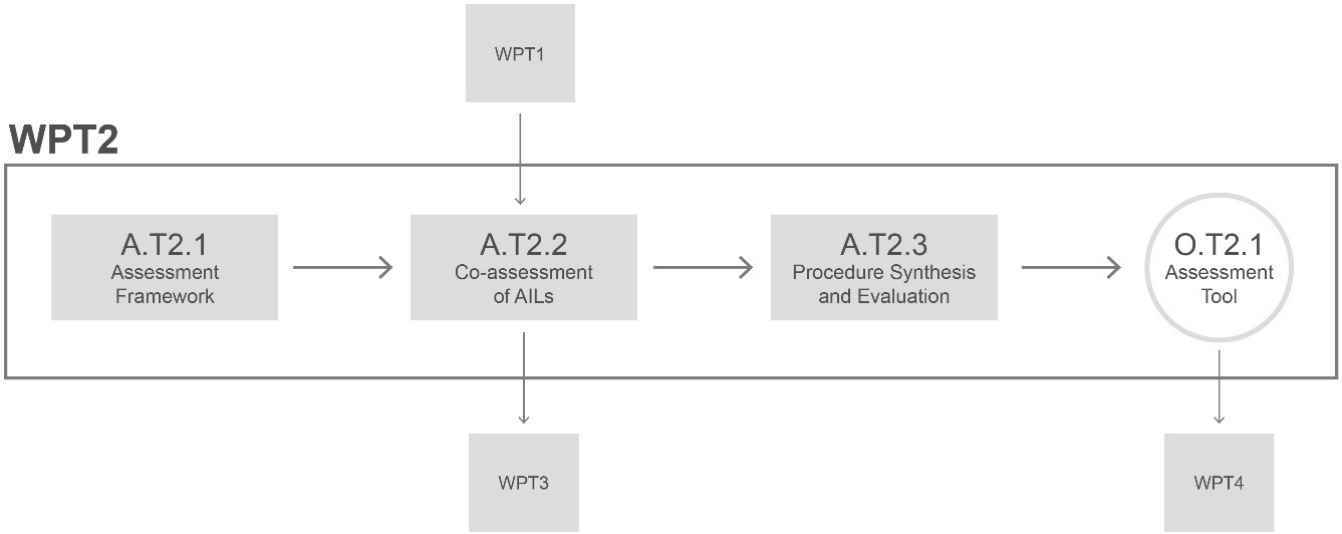
The assessment activities were carried out by individual research PPs. After each assessment the report was reviewed by the regional partners and the assessments were updated for the new pilot site. Below are the synthesised results of the feedback for each of the assessments:

Policy assessment

The policy assessment had two main parts. The supranational level carried out by the University of Ljubljana, Department of Landscape Architecture and the county, region and municipality level carried out by respective regional agencies;

- Slovenia: BSC, Business Support Centre L.t.d. Kranj
- Italy: LAMORO Development Agency
- France: Architecture, Urbanism and Environment Council of Vaucluse department 84
- Austria: Styrian Iron Route.

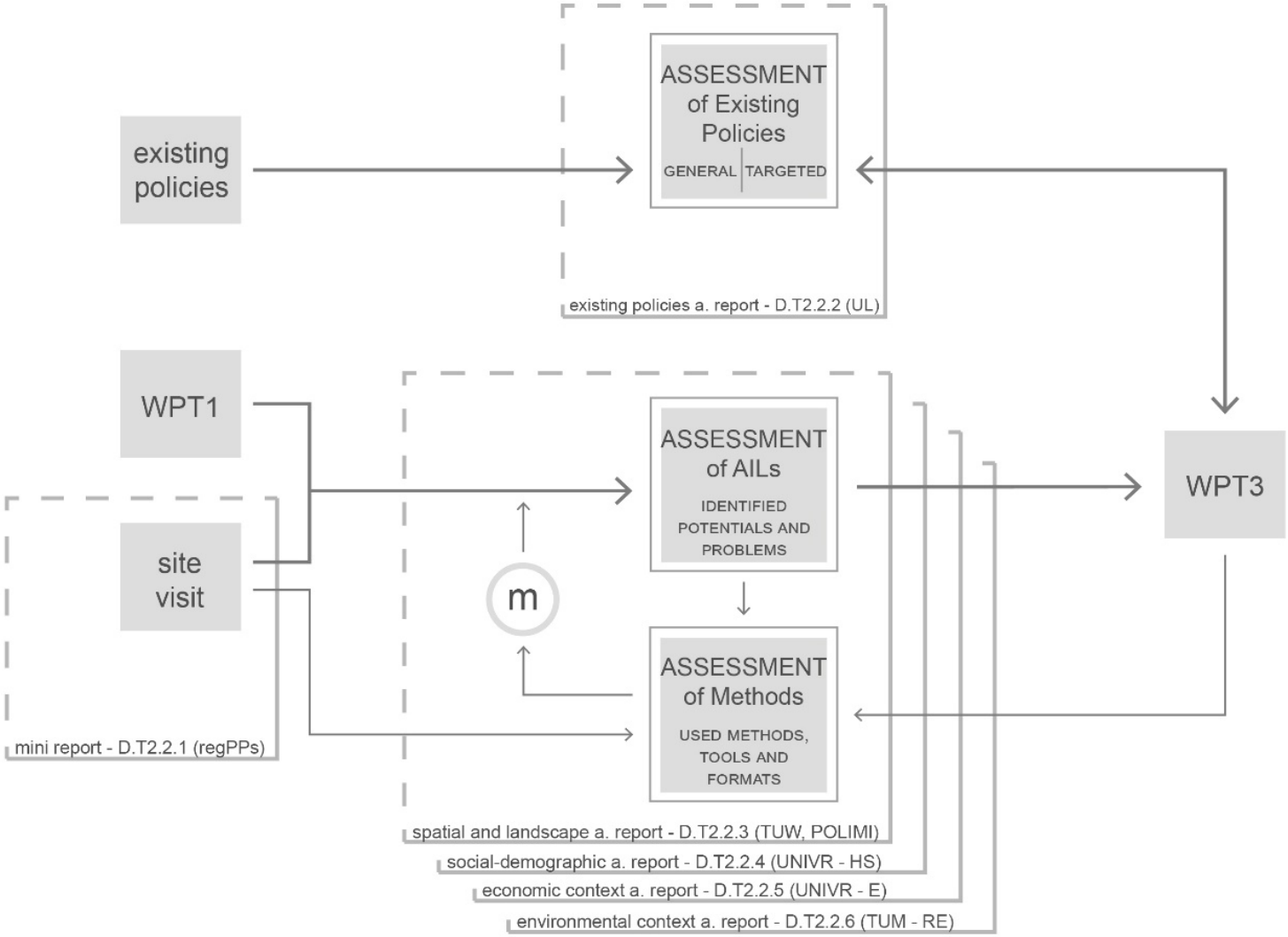
figure 1: Diagram of the WP T2 structure.



The supranational assessment aimed to provide content guidance for further research into AIL-relevant topics on lower administrative levels. For this, the findings were structured into six specific transformation topics which the regions can seek to further identify and pursue. These were: knowledge; research and innovation; sustainability; territorial cohesion; environmental protection; cooperation between countries and territorial governance. On the other hand the regional assessments aimed to facilitate two main goals. Firstly, to provide the reader with background knowledge on the administrative framework of the four pilot areas and secondly to analyse the main policy documents and identify their deficiencies for AIL transformation. The most common issues were: uncertain transformation vision for long-term development and a lack of financial support or other instruments for redevelopment. Other internal inhibiting factors were, for example, a lack of knowledge required to successfully tackle a redevelopment project of this size, or a lack of human resources to support the administrative tasks of a transformation project.

The policy assessment can be used in multiple ways: for the development of a project, in order to understand what policies you have in the area which can help plan the transformation; for raising public management and awareness by reviewing current policies and comparing development goals in order to reveal gaps in policies; and lastly, it can be used to create operational guidelines, as the review of policies provides the necessary background in order to apply for European funding.

figure 2: Diagram of co-assessment of AILs - activity A.T2.2.



Sifting through the policies in order to synthesise their key aspects and relevance for a subject is similar to an academic literature review. As such, the regional and local review of policies was at times a challenging task for the regional partners. Therefore, a policy analysis of the supranational (EU) level was carried out by the University of Ljubljana that provided, amongst other things, methodological guidance for regional reports, for example as a step-by-step guide on how one tackles and reviews a policy document.

Spatial and Landscape Assessment
Two research partners carried out the assessment: the Polytechnic University of Milan, Department of Architecture and Urban Studies (POLIMI) and the Vienna University of Technology, Department of Spatial Planning, Centre for Local Planning (TUW).

A major aspect in dealing with complex planning tasks is the multi-scale view of space. The assessment was split into the regional and local scales between the two research partners. On the regional scale, the TUW analysed the local conditions and circumstances. Within a deeper analysis of different indicators after the site visit they depicted the status quo of the site and the region. They identified strengths, weaknesses, opportunities and threats (SWOT) regarding the spatial development of AILs. From these results they identified significant problems, relevant for future transformation processes. On a local scale, the POLIMI evaluated the current spatial situation, infrastructural framework such as roads and railways, environmental and landscape frameworks such as environmental elements and ecological networks and settlement frameworks such as land uses, urban morphology and typology. Particular attention was given to the historical, architectural and cultural values, as well as to urban planning restrictions.

The results can be used to update the current situation but above all for the evaluation of any additions and changes to the current town planning forecasts such as the problem definition, spatial overview and visual and spatial representation of strengths or weaknesses. Maps can be the basis on which to overlay spatial findings with other findings.

The regional feedback has been quite consistent. The assessment has a general use as background information for further administrative actions. In one example (Italy) it uncovered new potential (archaeology). The majority of the analysis deals with general findings which are to some extent known. The assessment could be improved with an in-depth analysis and conclusions that are more operational (France, Austria).

The assessment is non-linear, hence the dimensions vary for each site visit. It is difficult to compare individual assessments and draw unifying conclusions. Crucial is the on-site research including the discussion with inhabitants. Due to COVID-19 restrictions, virtual meetings with stakeholders were essential to the gathering of local information for the Slovenian pilot site in 2020.

Socio-demographic Context Assessment
The department of Human Sciences of the University of Verona carried out this assessment.

The decline of industries produced profound changes in the fabric of the social life of the communities involved in the de-industrialization process, with consequences for relational dynamics, the system of values and norms, lifestyles and social structures. The sociological research was made up of three steps: Firstly, a qualitative ethnographic analysis of the de-industrialization process was made. Then a quantitative analysis of socio-demographic and social cohesion context

of the AILs was carried out and lastly a survey of the social impact of the transformation of AILs was conducted.

The social assessment offers the municipalities a social profile of the impact of the transformation in two outputs:

1. an objective perspective that is the description of the current social conditions of each investigated area
2. a subjective perspective that is the perceptions and opinions of the inhabitants of such areas towards the transformation of AILs and its related changes.

The Socio-demographic assessment was well received as it produced new insights into the sites and towns. On all pilot sites it has generated new understanding especially concerning the perception of local people. Mainly it will be used as a guideline for participation, direction and further engagement actions. The interviews that were carried out were challenging due to language and cultural barriers. People with local knowledge were suggested as interviewees for interviews in the future (Austria). The assessment could be improved with an in-depth analysis on some aspects (France).

The collection and analysis of the perceptions and behaviours of the residents, along with activities directly engaging the people, are crucial for the assessment. The assessment questionnaire included questions according to the specific context of the pilot site depending on regional needs. On the Slovenian pilot site, due to COVID-19 limitations, the computer-assisted web interviewing (CAWI) method was used instead of directly engaging the people. CAWI method results are inferior, and less cohesive as the ones collected directly on site

Economic context assessment
The Department of Economics of the University of Verona carried out the assessment.

The analysis of the economic impact of de-industrialisation in the pilot areas aimed at identifying and understanding the dynamics of the changes produced by the processes of de-industrialization on the production system, on the resources of the population and on the budget of local administrations. The economic research was made up of three steps: a qualitative analysis of the de-industrialisation process; a quantitative analysis of the economic context of the AILs; and lastly a survey of the economic impact of the transformation of AILs.

Our investigation may be useful for the local communities in formulating an initial estimation of the economic impact of de-industrialization and in understanding the main critical factors influencing the results.

The reflection of regional agencies on the economic assessments were varied. In Austria, all the results were already known, whereas in France and Italy the assessment was well received and will be useful in the future: in Italy, as background for public debates and in France as direct input for the decision-making process. The assessment could be improved with an in-depth analysis of the economic conditions around and after the closure of the site (France).

The assessment is dependent on secondary data availability such as national census data and its granularity. This was good in Austria, France and Slovenia, slightly outdated in Italy. For each pilot some of the questions changed depending on the availability. The assessment was adapted to each pilot. It added (depending on data availability) an assessment of the site's principal business sector (Italy), people's wishes about the site's transformation (all), respondents' sources of economic information and degree of risk aversion which can only happen through more discussion with local stakeholders (SMEs) and policy makers.

Environmental assessment
The Chair of Renaturation Ecology of the Technical University of Munich carried out this assessment.

An ecological assessment is essential when aiming at the transformation of AILs. This is because brownfields can increase regional biodiversity as they contain a network of open areas with irregular management and contrasting site conditions. Such ruderal habitats support numerous pioneer species and rare ecosystem processes. However, brownfields are at least partly polluted, and they are often colonized by invasive species, calling for costly interventions and long-term management to protect human health and biodiversity. On a landscape level, brownfields can contribute to habitat networks and such habitat patches and corridors should be integrated when planning the transformation process.

The assessment can be used to raise awareness of biodiversity. For example, learning about the ecological conditions enables us to learn about the potential for biodiversity and ecosystem services. It can be used as a support for planning ecological restoration. For example this assessment can help to identify targets and create a management strategy. Finally, it can be used to identify legal restrictions. For example some species or habitat types occurring on brownfields might be legally protected.

The environmental assessments have generated a valuable insight into the potentials of the brownfield sites. Generally, brownfield sites are not regarded as ecologically valuable ones, something that this assessment challenges. In addition to the general uses of the assessment, most praise was given to its planning recommendation. The assessment was improved by adding a non-scientific language for plant species. Further improvement of the assessment could come from even more detailed recommendations (Italy) as well as by widening the area of assessment (Slovenia).

Not all habitat units were present at every AIL. The target species had to be adapted to the history, size and structure of the site. In trAILs, the only parameter investigated was structural diversity - for future assessments, detailed mappings on randomly selected areas around the site, preferably in various land-use types, would be beneficial. Lack of participation and thematology of the stakeholders was a hindrance.

Policy assessment

MANCA KROŠELJ, NAJA MAROT, TOMAŽ PIPAN

A policy framework is a governance requirement in pursuing any development intervention in the territory. By investigating policy documents, in particular the aims and objectives of what a certain country or region wants to achieve, we can foresee the actions and measures in a certain area of intervention and fulfil these needs. Among such measures we can name financial instruments, regulatory changes or other instruments, all put in place with the intention of improving the current situation. Policies can be adopted on different administrative levels. In the trAILs project, we started the investigation at the supranational level (EU level) [1] and proceeded all the way down, examining the national, regional and local levels. The latter two were inspected on the basis of the four project cases, where we relied on the regional partners valuable insights [2]. Thus, the reader will find that the policy assessment procedure was designed and performed in a different manner from the other thematic assessments carried out for the four pilot sites. Namely, the analysis was based on the review work and a questionnaire survey with the partners, so it was not directly related to the field visits conducted in the other assessments..

The general aim of the policy assessment was three-fold. Firstly, it has served as an input, presenting framework conditions for the detailed assessments covering environmental, social, economic and spatial issues. Secondly, a questionnaire was administered to the regional partners to inspect their implementation and absorption of existing financial mechanisms supporting the transformation of AILs. Thirdly, it provides a transnational comparison of the policy framework for AILs, or in a broader context for industrial brownfield redevelopment, in the four cases across the Alpine area.

Work process

The policy assessment was carried out in three parts. The first part consists of a ground analysis of the supranational level of governance, where we investigated the coverage of the topic of AILs in the core EU policy sectors and documents. A keyword search was performed to identify the relevant objectives and measures that steer the development of AILs. Keywords, altogether 26, were divided in three groups according to their connotation: positive such as reactivation, reconversion, redevelopment and regeneration, negative such as brownfield, degradation and derelict and without connotation such as Alpine, cultural heritage, industry, landscape and periphery. Altogether, we analysed 11 strategies, one programme, one regulation and one treaty (table 1, page 63).

We continued to pursue the policy analysis in each of the projects' pilot state depending on the results from the supranational level among which were the policy priorities identified for the AIL transformation. The structure of the report and the questions to be answered by the regional partner were formulated as a guide for performing the policy assessment on the national, regional and local levels. Each of these reports provided information on the governmental and institutional framework, designated the regional and local actors, their influence and power for the transformation of AILs. In addition, we pursued policy analysis of the coverage and relevance of the existing domestic policy documents supporting transformation of AILs and identification of the policy gaps and drew conclusions.

The assessment concluded with the identification of the policy gaps by investigating the actual usage of the instruments supporting redevelopment in the pilot regions for their previous or current revitalisation projects. Often funding was brought up as a deciding factor for executing the

table 1: Reviewed policies by the sectors.

General	Europe 2020 Strategy (European Commission, 2010) DG REGIO: Strategic Plan 2016-2020 (European Commission, 2016)
Planning (spatial, regional)	Territorial Agenda of the European Union 2020 (European Commission, 2011) Leipzig Charter on Sustainable European Cities (EU Member States, 2007) Alpine Convention from 1991 (Alpine Convention, 2010) EU Strategy for Alpine Region - EUSALP (European Commission, 2015) EUSALP: Action Group 2 (AG 2) (European Commission, 2015) European Landscape Convention (Council of Europe, 2000)
Industry	DG GROW: Strategic Plan 2016-2020 (European Commission, 2016) A renewed EU Industrial Policy Strategy (European Commission, 2017) Strategies for resilient, inclusive and sustainable growth (European Commission, 2017)
Biodiversity	EU biodiversity strategy to 2020 (European Commission, 2011)
Energy	Energy 2020 (European Commission, 2011)
Culture	A New European Agenda for Culture (European Commission, 2018) 2019 Annual Work Programme of the "Creative Europe" Programme (European Commission, 2018)
Agriculture	Common Agricultural Policy (European Commission, 2001)

brownfield redevelopment. In addition, recent studies [3] imply incoherences of the relationship between cohesion policy, spatial planning and territorial governance in peripheries and specific regions, highlighting the challenges of governance at lower levels, particularly issues in accessing funding, difficulty of activating local actors to participate in projects, lack of capacities in policy making actions to build on the local conditions et cetera. Thus, with the policy analysis we wanted to investigate to what extent these weaknesses of the redevelopment process are also actually present also in our regions. This was the only way we could then formulate further guidelines for the EU and national policies focusing on redevelopment and contribute a valuable input for future research on place-based development.

Policy framework on the supranational level

Analysis of supranational policies, performed for the EU budget period 2014-2020, has shown that the AILs and their transformation are not a political issue relevant to policy at the EU level. Moreover, none of the core EU policies reveals degraded and former industrialised regions as a mainstream policy topic nor a priority intervention area. Consequently, the objectives and measures relevant for these regions are only covered under more general topics such as regional development or environment, or are hidden in more detailed parts of sectoral policies. Knowing that some of the previous INTERREG projects, such as the Central Europe project entitled Resource, 2009–2012 and Resource resolution, 2012, have already argued and tried to raise awareness of the need for more effective approaches to the transformation of

post-industrial regions at the EU level as well, we expected at least some common policy framework addressing the comprehensiveness of the problem across the sectors and disciplines. Unfortunately, at the moment there is no such policy that would support the integrative approach to transformation except for the newest Commission's initiative for brown coal regions which in 2020 materialised as a targeted strategy and at the same time a financial instrument. This strategy will be supported by a separate fund for the post-mining regions which will enable them to finance their transition projects. We believe this initiative could also be an opportunity for the industrial regions and the small and medium-sized towns to support their transition.

In total, we have identified 30 objectives, defined in a total of 16 policies that target AILs. The majority of these objectives steer the industry and the spatial planning sector. The general policy documents, culture, biodiversity and agriculture sector documents have fewer objectives, whereas the least AILs-related objectives were found in the energy sector. We have also considered the tourism sector as relevant for the conversion of AILs, however, there is no general EU policy available for this sector.

The majority of the objectives were found in the policies setting the general framework for the EU member states, spatial planning-oriented documents and industry sector-related policies.

We have summarised the main policy priorities for AIL transformation addressed by the policy objectives. The aspects should be further explored for the purposes of developing a transformation strategy for a specific AIL location and also for future access to EU or national financial incentives:

- Development of place-based strategies (Territorial Agenda for the EU 2020).
- Rural areas and small and medium-sized towns play a crucial role (Territorial Agenda for the EU 2020; Common Agricultural policy, shorter CAP).
- Development and improvement of opportunities and economic prospects in ecological values, environmental quality and cultural assets (Territorial Agenda for the EU 2020; The EU-Strategy for the Alpine Region, shorter EUSALP).
- Development of innovation and research capacity and transfer into practice (EUSALP).
- Building further on the position of the Alpine Region as a world-class region in terms of energy efficiency and sustainable production of renewable energy (EUSALP).
- Empowerment of people and businesses, particularly among SMEs and traditional industries (A renewed EU Industrial Policy Strategy).
- Transformation of industries and economies in a low-carbon and circular economy, creating new markets that drive jobs and growth and to improve framework conditions and business environments for investments (A renewed EU Industrial Policy Strategy; Strategies for resilient, inclusive and sustainable growth).
- Development of rural areas (CAP).
- Maintenance and enhancement of natural assets, such as biodiversity, ecosystems and ecosystem services and in general, to address the global biodiversity crisis (the EU Biodiversity Strategy to 2020).
- Valorisation of social and cultural aspects of beneficial transformations (European Agenda

figure 1: Regional and local stakeholders according to the levels of the influence (left) and prevailing roles of the actors by countries and the number of each of the stakeholders' type representatives (right).

for Culture; Strategies for resilient, inclusive and sustainable growth).

- Extending Europe's leadership in energy technology and innovation (Energy 2020).

Analysis has also shown us that in contrast to the objectives which do not directly target AILs, the measures introduced by the EU show differently (listed in the chapter dedicated to EU instruments and incentives). Although, there are several funding opportunities for these regions, they are only utilised in a limited manner. Firstly, these instruments are not region-specific (except for the Cohesion Fund and regions that fall below 75% of average EU GDP). Secondly, these regions most likely do not have the human and knowledge capacities to write applications to access the money nor are necessarily familiar with these funding opportunities. Thirdly, regions may most strongly be interested in spatial development, or in other words direct investment, as investment in land and construction is a measure supported only by the Cohesion Fund and is thus restricted to regions lagging behind.

Governance framework at the regional level

The comparative analysis shows that the four investigated cases of Eisenerz (Leoben district in Styria state), L'Argentière-La Bessée (Hautes-Alpes deaprtment in the Provence-Alpes-Côte d'Azur region), Borgo San Dalmazzo (Cuneo province in the Piedmont region) and Tržič (Gorenjska region in the Western region) vary in governance framework, institutional settings and experiences with transformation, concerning both the procedural and financial dimensions. Going into

more detail, we learnt about the policies, actors, tools and the competences of the regions involved in steering the transformation of AILs. We were able to identify the following as the most influential actors (figure 1, page 65) in the transformation of AILS in the cases compared:

1. Administrative institutions, such as municipalities (AT, FR, IT, SI) and other authorities (AT, FR, IT) such as authorities for environment, quarries, mines, economy, tourism, planning, cultural heritage.
2. Owners of the site, such as private companies (AT, IT, SI) or state-owned agencies responsible for land management as in the case of ADEME – Agency for the Environment and the Control of Energy (FR).
3. Inhabitants (AT, SI).

The analysis of the national policies in the four cases shows similar results as the analysis at the supranational level. None of the countries reported an existing national policy targeting for degraded areas. The individual examples of strategic documents can be only traced down to the regional and local level. Most commonly the topic is covered by regional development programmes, LEADER/CLLD strategy or spatial plans on a municipal level. Thus, more strategic support for the AILs transformation can be found directly by incentives introduced by the EU than at the lower governance levels.

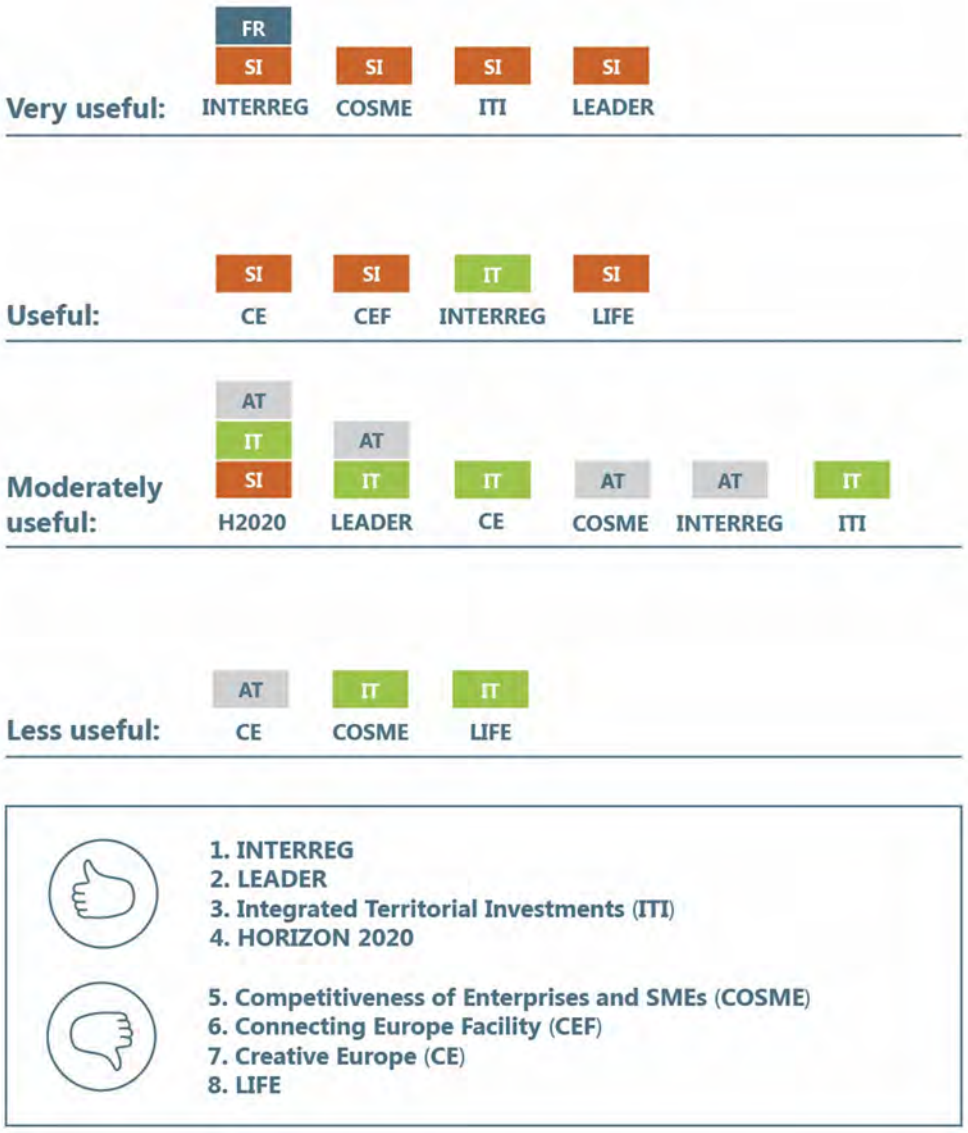
The comparison of the questionnaires shows several options available for transformation, however, they are only moderately utilised by the partners, depending on their experience. Among the factors limiting utilisation of the funds, regional partners identified lack of connections to potential project partners, demanding application forms, lack of human capacity and lack of expertise among the potential project partners. As raised by almost all partners, the EU or the respective national institutions should offer support to improve the knowledge of the actors on the regional level. Partners have also elaborated which incentives they know and have already used, and which they plan to use in the near future. Among the first we can list INTERREG, LEADER/CLLD, Horizon 2020 and the Creative Europe programme that the regional partners know very well. For the purposes of brownfield redevelopment in the near future, the INTERREG and LEADER/CLLD are most likely to be used. From their selection one could conclude that the number and variety of the instruments are not as worrying as is their ability to make use of them (figure 2, page 67).

Conclusions

The policy analysis resulted in several conclusions that can be generalized as relevant for the transformation of Alpine industrial landscapes, since the four regions in question show variety in governance framework, institutional settings, and most importantly, experiences with transformation, in terms of both procedure and finance.

The analysis of the policies at the European level showed that for the 2014–2020 period there is no targeted umbrella strategic policy available for the brownfield areas, however, individual objectives and incentives can be linked to this purpose. The same conclusion applies at the national policy level. The individual examples of strategic documents can be only traced down to the regional and local level. Most commonly this topic is covered by the regional development programmes, LEADER/CLLD strategy or spatial plans at the municipal level. More support for the AILs transformation can be found directly from incentives introduced by the EU, such as INTERREG, COSME, Creative Europe and other programmes.

figure 2: Usefulness of the listed EU incentives already applied by countries.
Answers to question 5: From your experience, how useful do you see the following EU incentives for a brownfield redevelopment?



These programmes channel the resources for the objective of transformation through different priorities, for example environmental, cultural heritage or tourism development, energy transformation et cetera. Available options are only moderately used by the partners, depending on their experiences with the transformation process. As the most problematic factors hindering utilisation, regional partners identified lack of connections to potential project partners, too demanding application forms, lack of human capacity and lack of expertise and know-how. Although named by almost all partners, however not for all the incentives, these factors should be addressed by the EU or by the national institutions by better disseminating the information and offering relevant trainings.

Having this in mind, the logical conclusion is that more targeted instruments would make access funds easier because partners could stay focused and would not need to diversify their efforts to access the funds. Also, the national governments should put more effort into directly supporting the transformation of the regions, not only by analysing their characteristics and preparing databases as is the case in Slovenia, but also by means of direct financial incentives.

Regarding the administration framework, the major role in the transformation process has been designated to the local level. There is a difference in the intermediate administrative organization for which the French have several bodies supporting inter-municipal governance and thus rely more on the bottom-up approach to redevelopment. The three other countries, however, continue to apply more top-down approaches to transformation. In Slovenia, the largest role in the transformation process is expected from the Regional Development Agencies, the regional institutions in charge of the preparation and implementation of the regional development programmes as the main policy document for supporting access to EU funds. Otherwise, the municipalities take on the major role in the spatial planning process. Thus, the municipalities should be the ones to work on their skills and knowledge to support the transformation and the financial incentives should be made user-friendly for municipalities to access. The skills, listed by the partners as the most important for the transformation process are strategic thinking, marketing, promotion and business settlement, creative thinking and financial expertise.

The current transformation practices mostly include partial solutions and only cover the preliminary phases of the transformation including physical rehabilitation of a degraded area or preparation of a strategy. Since no comprehensive approach to transformation is applied, regional agencies are obliged to seek resources for short-term or "soft" solutions. This situation might also be due to the fact that brownfield regeneration requires substantial effort and financial input which investors and/or public stakeholders are not able to provide, thus they resort to partial solutions. In order to overcome such "ad hoc" approaches, the policy assessment concludes with five key policy recommendations as presented:

1. In strategic policies on all governance levels, brownfields should be recognised as an opportunity and a regional potential, instead of a burden for localities and regions.
2. The EU, regional and local communities need more targeted policies and incentives, supporting very different aspects of the transformation of industrial landscapes.
3. The Alpine context is not decisively influencing the transformation of industrial landscapes; the only relevance is in the governance setting, experience of partners and potential of the good practice exchange.

4. The national governments should provide regions and local communities with opportunities to gain, improve and diversify the knowledge and skills required for the transformation process, including acquiring the finance, networking, spatial planning, marketing and promotion skills. Regions and local communicates should also actively seek such opportunities.
5. EU and domestic administrative authorities should encourage and promote better rehabilitation and reuse of brownfields by seeking restitution from responsible actors - "polluter pays principle" -and most importantly, promote, adapt and monitor the use of already existing studies, good practice examples, and regionally developed tools for the transformation of brownfield sites.

Endnotes

1. For further information, see: Krošelj, M., Marot, N., Pipan, T. (2020) Comparative analysis of policies targeting Alpine industrial landscapes (AILs). Part of Work Package T4 – Manage AILs: knowledge transfer and capacity building. trAILs – Alpine Industrial Landscape Transformation / 2018-2021"

2. For further information, see the regional reports of the Existing policies on local/regional level (2019):

- Brankovič, U., Terčon, S., Cvenkel, H. (2019) Existing policies on local/regional level assessment report: Tržič – Slovenia. Part of Work Package T2 – Assess AILs: assessment procedure. trAILs – Alpine Industrial Landscape Transformation/2018-2021. Kranj: Gorenjska, BSC, Business Support Centre L.t.d. Kran;

- Kleitz, T., (2019) Existing policies on local/regional level assessment report: L'Argentière-la-Bessée and La-Roche-de-Rame – France. Part of Work Package T2 – Assess AILs: assessment procedure. trAILs – Alpine Industrial Landscape Transformation/2018-2021. Avignon: Provence-Alpes-Côte d'Azur, Architecture, Urbanism and Environment Council of Vaucluse department;

- Pechhacker, J., Tiffner, G. (2019) Existing policies on local /regional level assessment report: Eisenerz – Austria. Part of Work Package T2 – Assess AILs: assessment procedure. trAILs – Alpine Industrial Landscape Transformation/2018-2021. Wien: Technische Universität Wien, Department of Spatial Planning, Centre for Local Planning;

- Umberto, F., Abluton, S., Curato, V. (2019) Existing policies on local/regional level assessment report: Borgo San Dalmazzo – Italy. Part of Work Package T2 – Assess AILs: assessment procedure. trAILs – Alpine Industrial Landscape Transformation/2018-2021. Piemonte: Asti, LAMORO Development Agency.

3. See: ESPON (2013) TANGO - Policy Brief on Shrinking Rural Regions in Europe: Towards Smart and Innovative Approaches to Regional Development Challenges in Depopulating Rural Regions. Luxembourg: ESPON EGTC. Version 20/12/2013. See: SPON (2018) COMPASS - Comparative Analysis of Territorial Governance and Spatial Planning Systems in Europe. Final Report. Version 10/10/2018. See: van der Zwet A, Bachtler J, Ferry M, et al. (2017) Integrated Territorial and Urban Strategies: How Are ESIF Adding Value in 2014-2020. Final Report. Luxembourg: Publications Office of the European Union.

Spatial and functional assessment

ELENA SOLERO, GIORGIO VITILLO, PAOLO GALUZZI, JULIA FORSTER, MICHAEL RINNERTHALER

Spatial analysis focuses on the main spatial elements needed as a base for the development of planning pathways on a multi-scale level. The spatial assessment report has two main purposes. First, it is a document providing essential knowledge of a specific AIL pilot area, and second it is a record of reflection on the assessment method performance in the pilot site. With the 'learn-by-doing' approach in four different pilot areas, research project partners identified and gradually specified key elements of individual assessments that work for AILs. The template of the assessment report used in all pilot areas has been structured to facilitate two main parts of the co-assessment of AILs:
Part 1 – Assessment of AILs which constitutes main findings of the AILs actual conditions, results of the assessments, conclusions and recommendations. It is intended to be used for the activities in the next step - workshops with relevant stakeholders.
Part 2 – Performance of the assessment that investigates how the assessment and its parts performed on the given AIL site. It was conducted through a reflection questionnaire for the research partner and regional partner of that AIL. Its purpose is to evaluate the analyses used in the assessment process and to monitor variability of the assessments across the AIL pilot sites.

Territorial and local spatial analysis
Spatial analysis involves a double scale level: territorial analysis in order to give an overview of the location and in-depth analysis more concentrated on the pilot area and its immediate surroundings.
The spatial assessment is structured in four analysis topics:

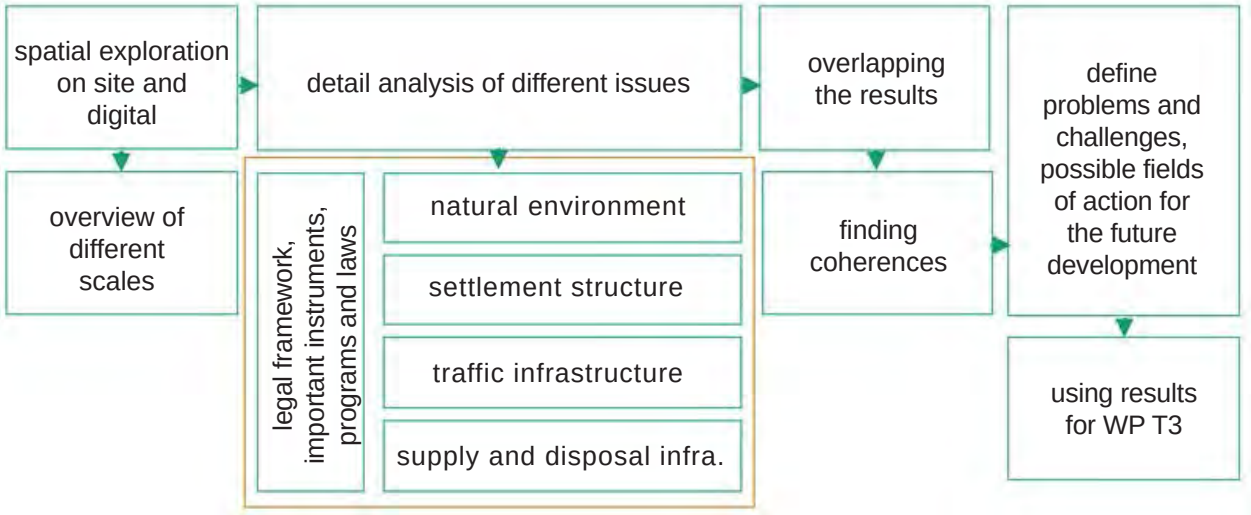
- the environmental analysis, which covers the analysis of the topographical situation, the landscape and the natural environment;
- the settlement analysis, which contains information on the settlement structure and the existing building stock;
- the mobility network analysis, which covers the analysis of the accessibility, traffic and transport network and public transport services;
- the supply and disposal infrastructure, which covers a description of access to ICT and energy infrastructure, water supply and disposal infrastructure.

In addition to these analyses, spatial assessment has to take into account plans and projects in progress, relevant to mobility, environmental and settlement framework. Understanding these elements and the urban planning rules permits us to understand the direction which future development will take.

Steps of the assessment
The aim of the assessment is to find problems, challenges and potentials regarding the spatial conditions. Following the analysis relevant to the environmental, settlement and infrastructural framework, the potential and challenges were assessed and mapped in order to highlight the main issues to which project must relate. The method used in the research subdivides the assessment into four main steps:

1. Spatial exploration (on and off site) to gain a first overview and impression of the site/region: a site-visit with an inspection of the site. Important was to have contacts with local/regional stakeholders during the site visit and in a roundtable discussion. Inspection of the towns was also important to get to know the settlement structures and to discover potentials as well as problems and challenges. Digital exploration took place via VR (Virtual Reality): "flying" over the region in a 3D-environment (Google Earth VR) and viewing

figure 1: Spatial analysis diagram



of the local situation with 360° photos taken on the site-visit.

2. Detailed analysis of different issues by means of:
   - on-site research (get to know the region in detail)
   - collecting GIS data and drawing up maps
   - collecting and processing statistical data
   - contacting local/regional stakeholders (interviews, roundtable discussion)

   The collected information was relevant to the natural environment and landscape, the settlement structure, the mobility framework and accessibility as well as the supply and disposal infrastructure.
3. After the collection of all the different materials, the results were overlaid to find possible coherences between the analysis elements. This step can reveal problems and potentials.
4. In conclusion, problems and challenges were defined, as well as potentials presented by the municipality and the region which also contain some possible fields for action for future development of the site.

Formats used:

- own GIS based maps
- existing GIS-based maps
- VR (Virtual Reality)
- 360° photos
- photo documentation
- diagrams
- interviews / stakeholder discussion rounds
- text analysis (of concepts)
- descriptions (as texts)
- thematic maps

Analysis elements review

The main elements relevant to spatial analysis can be summarised as below:

Analysis frame	Analysis element	Output description	Output usage	Usefulness for this AIL
Environmental and Landscape analysis	topography and terrain	mapping and qualitative description of the topography via contour lines and terrain base map in GIS; on-site research and photo documentation (+360° photos) of the terrain and landscape; 3D model of the terrain, implemented in the web-visualization – spatial exploration in a digital way	identification of possibilities and limitations. basic preparation work to be able to set urban designs and ideas in a spatial context. Improves quality and professional appearance of project outputs (renderings, models, designs)	evaluation
	location and type of nature protected areas	mapping of the location of nature protected areas in GIS; description of types of protected areas	identification of possibilities and limitations	evaluation
	land use	mapping of the land use (by CORINE Land Cover) in GIS and quantitative interpretation (chart)	basic land use information helps to indicate former usage and illustrates frameworks for future use (sealed or paved soil)	evaluation
	danger zones	mapping of the risk zones (for flood, mountain torrents and avalanches)	identification of possibilities and limitations	evaluation
	visual landscape and landmarks	on-site research (visual impressions, sight axes) and photo documentation of the overall appearance of the landscape and of important landmarks	usage mainly for analysis, preparation and presentation purposes – basic information* to be considered in designs and scenario developments that respect local conditions	evaluation
	green and blue elements	identification of all natural and environmental elements	ecological and environmental network	evaluation
	ecosystem services	mapping and qualitative description of the ecosystem (by selected indicators)	prioritization, definition and problem identification in relation to different synergies	evaluation
	territorial fragilities	mapping of territorial fragilities and risk areas	risk prevention strategies resilience enhancement general awareness and overcoming	

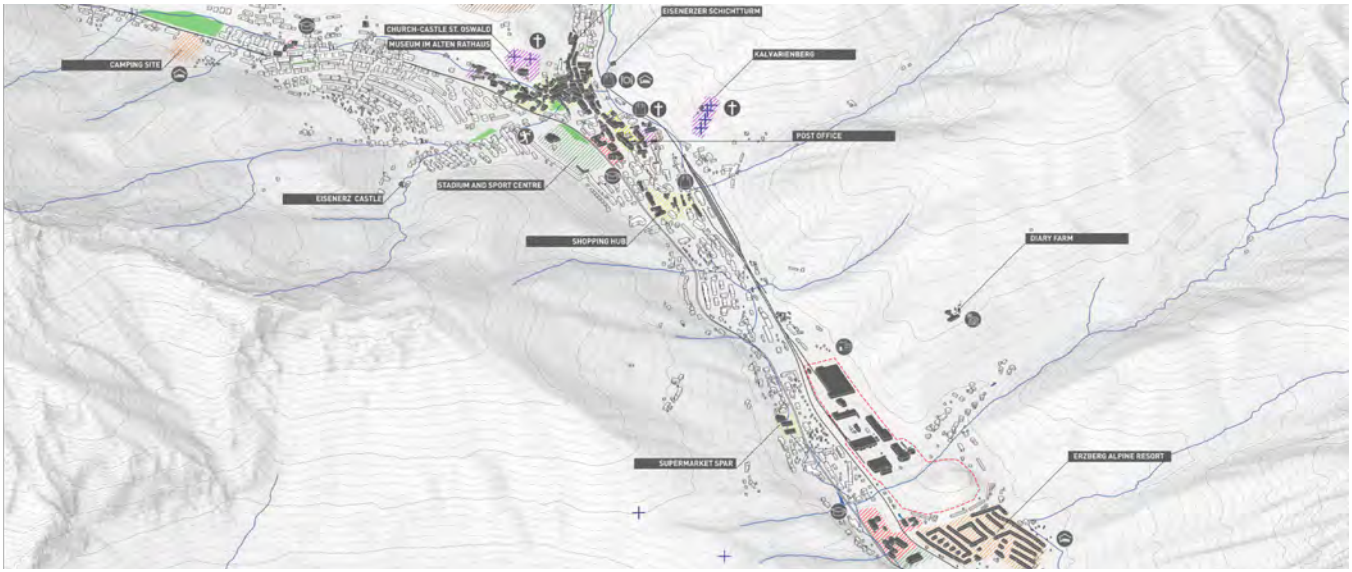
Analysis frame	Analysis element	Output description	Output usage	Usefulness for this AIL
Settlement analysis	typology of the settlements	mapping of the settlement structure and categorisation of different types of structures	basic information to be considered in designs and scenario developments that respect local conditions	evaluation
	historical settlement and cultural heritage	mapping of the historical settlement structure and buildings	area enhancement	evaluation
	industrial settlement and activities	mapping and qualitative description of industrial area (in activity and abandoned)	basic information to be considered in designing scenario development	evaluation
	urban facilities	mapping of facilities	basic information to be considered in designing scenario development	evaluation
Analysis frame	Analysis element	Output description	Output usage	Usefulness for this AIL
Mobility network and accessibility analysis	road network and classes	mapping and categorization of the road network, main road connections	basic accessibility analysis	evaluation
	rail network and classes	mapping and categorization of the rail network, main rail connections	analysis of used and unused rail infrastructures, kind of usage (passenger or cargo transport)	evaluation
	public transport system	qualitative and quantitative description of the public transport system	basic accessibility analysis	evaluation
	reachability, accessibility	qualitative description of the reachability, mapping of distances and travel times	basic accessibility analysis; enables the identification of possibilities and limitations of the existing mobility infrastructure grid	evaluation
Analysis frame	Analysis element	Output description	Output usage	Usefulness for this AIL
Supply and disposal infrastructure	ICT supply	description of the connection to ICT supply (fixed-line, mobile communication network, broadband network)	identification of possibilities and limitations	evaluation

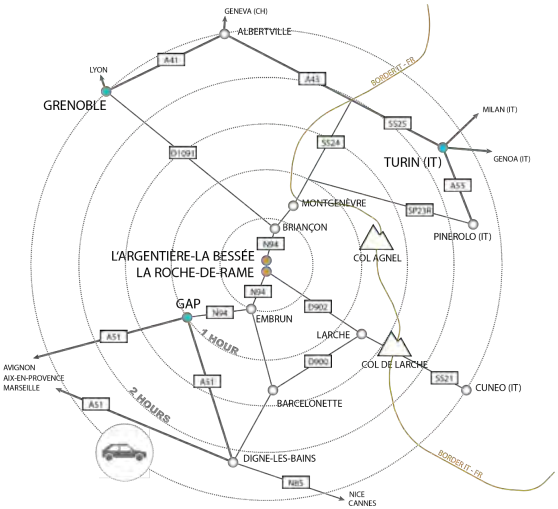
Results of the assessment

In the research, the spatial analysis was carried out both on a territorial and on a local scale. The outcome of this analysis can be summarised in the following three points:

1. According to the major urban systems investigated, such as infrastructures, mobility networks and settlements, the in-depth study of the know-how of the capabilities, values and risks, was beneficial for both the municipal technical offices (specialist-knowledge) as well as the local communities (general-knowledge). Specifically for municipal technical offices, this investigation can be useful for preparing programmes, projects and actions of public policy or according to crowd-funding to benefit public works and infrastructure developments. On the other hand, the same study could increase local competence and responsibility.
2. An initiation of public debates and discussions was crucial for the establishment of an active and innovative participation for the site-visit phase as well as the workshops which followed. These initiatives provided significant aspects for the roundtable discussions and succeeded to organise local networks of social and institutional representatives, which provided valuable insights on how to create a detailed plan for a local development project.
3. Another outcome is to provide the planning recommendations with appropriate elements which can be used as a reference, in order to lay down environmental, infrastructural and settlement frames. Or alternatively, to provide different scenarios, which can be used by local communities for the revision of their planning.

figure 2: Eisenerz, Heritage and urban polarities
figure 3: Road network french pilot region, accessibility of the pilot municipalities by car
figure 4: 3D visualization of the main problems and potential of Eisenerz in regards to the settlement structure, the mobility framework and the landscape and natural environment





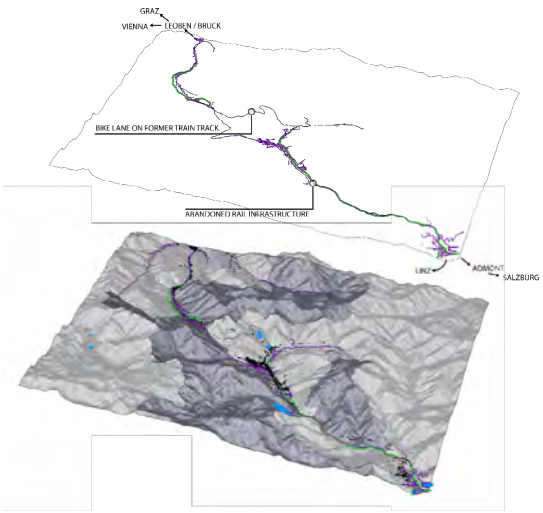


figure 5: L'Argentière-la Bessée; settlement, heritage and urban polarities

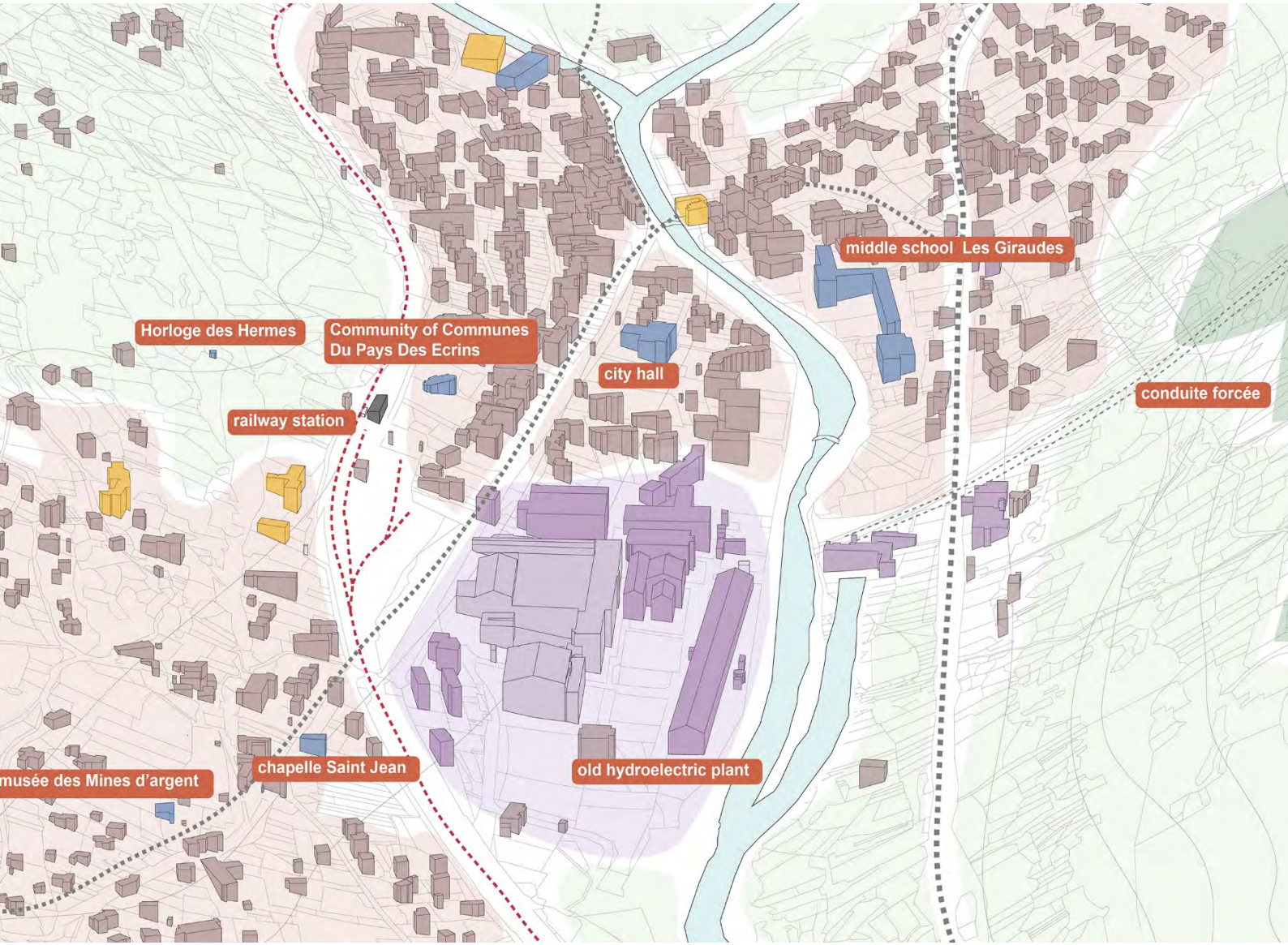
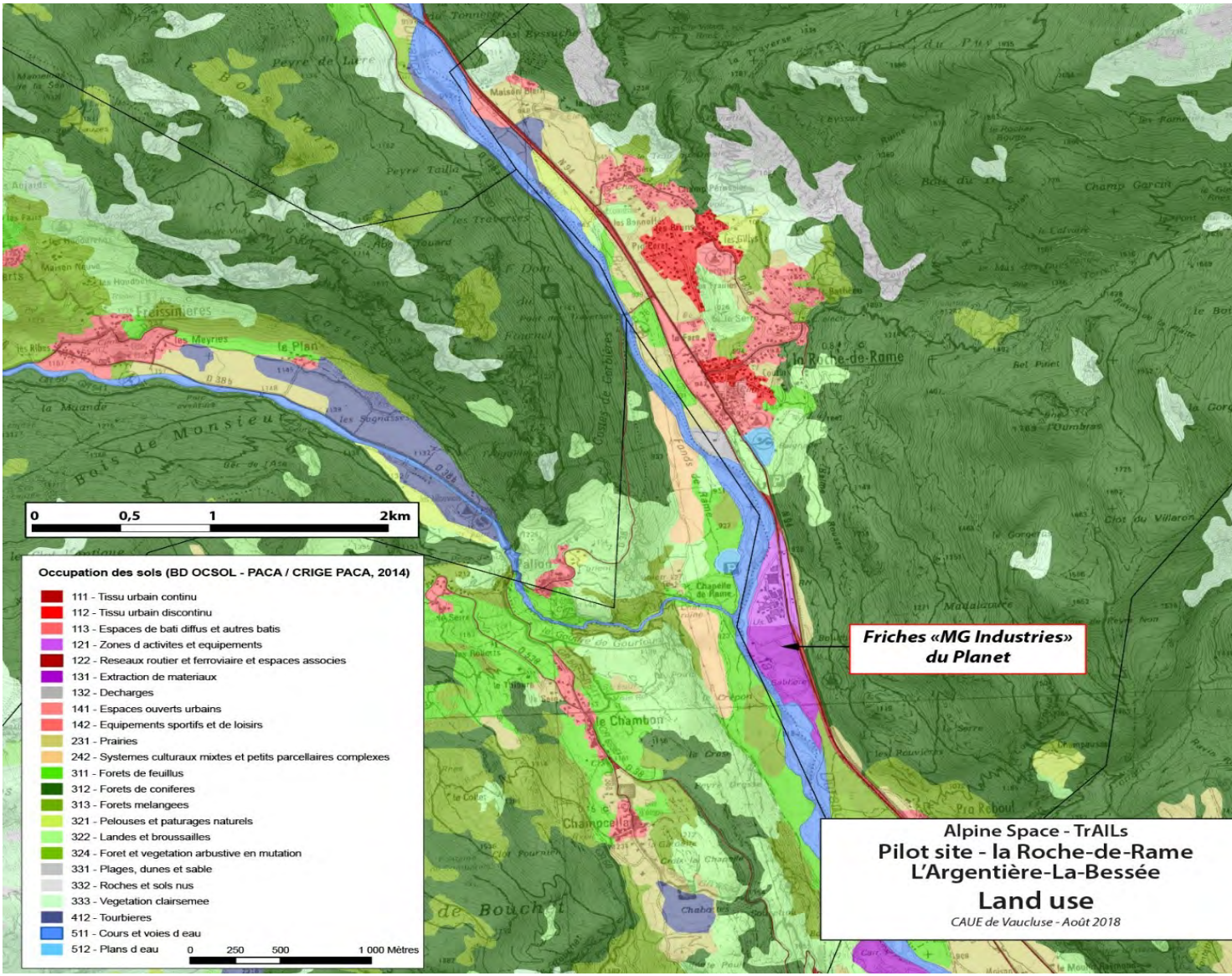


figure 6: Landuse of the municipalities L'Argentière-la Bessée and La Roche-de-Rame, edited by CAUE84, 2018, Co-design workshop in L'Argentière-la Bessée



Socioeconomic assessment

LIRIA VERONESI, LORENZO MIGLIORATI

Alpine brownfields as cultural landscapes

Robert Ezra Park (1864-1944), the most influential figure of the Chicago School of sociology, loved to tell his students that the beginning and end of social research could be summarized in the invitation to "Get the seat of your pants dirty in real research". Chicago in the first half of the 20th century was a metropolis undergoing tumultuous growth and transforming itself radically under the pressure of advancing industrial modernity. Industrial gigantism moved at the same pace as urban gigantism. Transformations in society and the fabric of relationships and social phenomena moved in step with transformations in the space. Novel problems arose that the preindustrial society had not previously known: marginality, deviance, integration and disintegration, issues around individual and social identity, and new meanings of space and time.

The main outcome of the Chicago School is likely the unavoidable link between space and the meanings that social actors attribute to it within the scope of social change. While the panoramas of post-industrial brownfields that dot the Alps[1] are the exact opposite of Chicago a hundred years ago, the cultural landscapes are surprisingly similar. This brief article aims to identify the function of social research in analysing transformation processes in Alpine territories in a post-industrial sense and the social and cultural regeneration of mountain communities dealing with industrial decommissioning processes and the ensuing sociocultural changes.

An Italian anthropologist with a deep knowledge of Italian mountain landscapes recently wrote that "the Alps do not divide, but rather unite [...]. There is incontrovertible geopolitical evidence: the arch of the Alps is not a barrier but a tie between different peoples[2]". There is evident cultural continuity composed of stories, experiences, representations, symbols, and values that join the arch of the Alps and the people living there. It is sometimes surprising how the only true difference seen in crossing the Alps is only the time lag of the events. Among these, the twentieth-century industrial history of many Alpine communities is perhaps one of the most obvious examples. As a result, many brownfield sites in Alpine valleys are not only physical ruins, often too cumbersome for the Alpine communities that should decide their future, but above all testimony of a more or less recent prosperous past, a symbolic apparatus of local identity, stages in which sometimes even bitter conflicts take place; in a word, cultural landscapes.

This expression indicates the group of operations that individuals and social groups make to confer sense on the place, transforming the territories they inhabit and use such that the landscape becomes more than a simple environment and its construction a true cultural act. The most explicit dynamics that communities activate in the cultural transformation of the territory regard processes of building entire worlds of recognition and definition and identity transformation. Industrial settlements throughout the Alpine arc that have previously been or are being decommissioned entail social practices which attribute meanings that are extremely intriguing because, through the use of adequate epistemological and methodological tools, they unveil the progressive symbolic settling that communities have inscribed on them to define who they were, are, and who they want to be.

In extreme synthesis, brownfields, especially those in mountain, particularly Alpine, contexts characterized by substantial identifying uniformity, can, among other aspects, be observed as functions of collective identity for the communities living there along at least three fundamental lines:

table 1: General framework for a socioeconomic assessment of de-industrialisation

	Past	*Present*	*Future*
Topic	Collective representations of the past (Industrial Age)	Prevalent conditions of well-being (Transitional Age)	Images of the future (Post-Industrial Age)
Methods	Qualitative: ethnographic	Quantitative: econometric	Mixed methods
Tools	In-depth, biographical interviews; sessions of ethnographic observation; Critical incident	Surveys; secondary data	In-depth interviews; Survey; Visual Choice Experiment
Scopes	Reconstruction of the sense and signs of industrial memory; revision of identity, routinization	Analysis of well-being, quality of life, and social cohesion in the present state	Co-construction of scenarios; surveying the degree of identity sharing; transformation with cooperative and participatory tools
Engagement of local actors	Population: high Political decision-makers: low Moral entrepreneurs: high	Population: high Political decision-makers: low Moral entrepreneurs: low	Population: high Political decision-makers: high Moral entrepreneurs: high

1. The past, in relation to constructing and selecting collective memory and meanings of the industrial era that are more or less shared.
2. The present, in relation to the incidence and consequences of the presence of an often rather marked sign of disuse in the mountain landscape.
3. The future, in relation to the image that local communities have of themselves on the post-industrial horizon[3].

A comparative approach in the diachronic and socioeconomic multidisciplinary sense therefore seems to be of great interest and certain utility in processes of local development and transformation of decommissioned areas (table 1).

Industrial Age: routinizing the memories of identities that have disappeared

Only a stereotypical vision rooted in common, 'urban-centric' sentiment ascribes arcadian and bucolic ideas of being pure, typical, natural, and untouched to the Alps. In reality, the mountains — to a certain extend everywhere in Europe and particularly in Alpine territories — are or were an important space for production, the terrain of great economic excitement, a resource for growth[4], especially in the modern industrial era of the nineteenth and twentieth centuries.

Rebuilding the context, in which that often tumultuous and disordered development matured, is of great importance when starting to transform and renovate decommissioned industrial spaces. Processes of building local collective memories are

figure 1: In-depth Interviews.

rooted in two apparently paradoxical dimensions. The first relates to the fact that the memory does not regard the past as much as it does the present. In other words, those who remember have nothing to do with the past, but only with themselves, who today choose what to recall. Collective memories therefore consist in selecting and reconstructing the past based on the values and standards of the present.

The second paradox relates to forgetting: there would be no memory if it were not possible to forget. If memory were not a selection of the past to remember — implying the possibility of letting go of certain memories — what we remember would just be a mass of disordered, confused information about an inert past. It would be the story of 'Funes the Memorious', so masterfully told by Jorge Luis Borges.

This digression allows us to reach the heart of the issue: memory is a function of identity, both individual and collective[5]. It is therefore of fundamental importance to rebuild the framework supporting the memory of the industrial past held by a community interested in a process of urban regeneration. Questioning social actors about the sense of their identity, the signs and symbols through which they recognize themselves, the meanings of their own industrial past often represented as a golden age irredeemably lost and which should be collectively mourned, telling stories about life and the factory, collecting testimonies: all these actions are aimed at understanding the collective representations of a community that has experienced industrial transformation and necessarily a revision of its identity in a more or less recent past.

Understanding the sense of the past in the observed communities does not represent just simple interest in the past or folklore, but rather a strong epistemological need tied to understanding the ongoing or completed transitions within sometimes culturally traumatic processes[6]. A space is thus opened for shared memorialisation and routinisation of the past that consequently ends by being coherently inscribed and situated in the definition of the new social identity of the community. In other words, creating a memory of itself is a tool for coming to terms with the past and, where necessary, for developing transitions that are often latent and unexplored (figure 1, page 80).

Transitional Age: social cohesion and quality of life in the present

The process of reconstructing and defining the social identity of communities dealing with industrial decommissioning falls in the present time of a social reality in transition. The past cannot be recovered, the future has not been designed yet, and the decommissioning is associated with processes of tangible and intangible impoverishment.

In this sense, focusing sociological and economic observation on the actors' well-being, refining it in precise, specific dimensions and indicators is also useful for identifying the socioeconomic regeneration that the community can implement in a hypothetical renovation of the territory. From the sociological perspective, the most meaningful aspect is *social cohesion*, considered a dimension of a community's quality of life. In recent years, this concept has attracted political interest on multiple levels — local, national, supranational — for at least three reasons. Firstly, social cohesion is viewed as a condition for social and political stability; inequality, rifts, and internal friction in a community increase the risk of erosion and collapse of a social and political system. Secondly, social cohesion is considered a source of economic growth, as many studies relate social cohesion to economic performance. Finally, a good level of social cohesion in terms of inclusion in the job market, civic participation and group membership, strong social ties, and solidarity among networks of citizens results in reducing public spending for services and social benefits, which are replaced by the resources put into circulation by the community itself[7].

Against the background of a transition from a solid industrial identity to a post-industrial context, it is necessary to verify if what follows is the erosion of the social fabric and loosening of social networks or if there is instead a response in terms of the community's social endurance. To do so, it is important from a methodological point of view to consider a defined set of indicators appropriate for measuring social cohesion.

Elements that inspire of social cohesion:

1. Trust, intended as "an expectation of experiences with positive value for the actor, developed in a state of uncertainty" (un'aspettativa di esperienze con valenza positiva per l'attore, maturata sotto conduzione di incertezza) [8], expressed as interpersonal trust between residents in the same municipality and institutional trust attributed to local and national political institutions.
2. Civic engagement, understood as participation in activities whose goal is to improve community life and which entails the adoption of pro-social conduct and behaviour.
3. Membership commitments, that is, involvement in group experiences, both in terms of membership and effective participation, favouring universal behaviour and conduct.

4. A sense of belonging to the local territorial community entails relationships with the ecological aspect of the territorial location, the mental aspect of the identity of the place, for example the definition of the self, based on a sense of belonging to the local community), and the social aspect of solidarity, inclusion, and the sharing of norms and values that characterize the municipal community[9].
5. Supportive relationships, that is, the presence of people you can depend on if needed, thus providing forms of social capital.
6. Social tension and safety, intended as the perception of the presence of rifts and social disorders and the presence of risks that can threaten security and personal safety.

From the economic perspective, the analysis of conditions of the community's material well-being focuses on unemployment rates, available wealth, education, and the development of new economic activities (figure 2, page 83). Relationships between the industrial site and the consequences perceived by the social actors with regard to decommissioning and possible regeneration are also analysed.

Post-Industrial Age: imagining the future

Analysis of the socioeconomic impact of decommissioning industrial activities requires a third step related to studying images of the future regarding the transformation of the decommissioned site and the revision of the community's social identities.

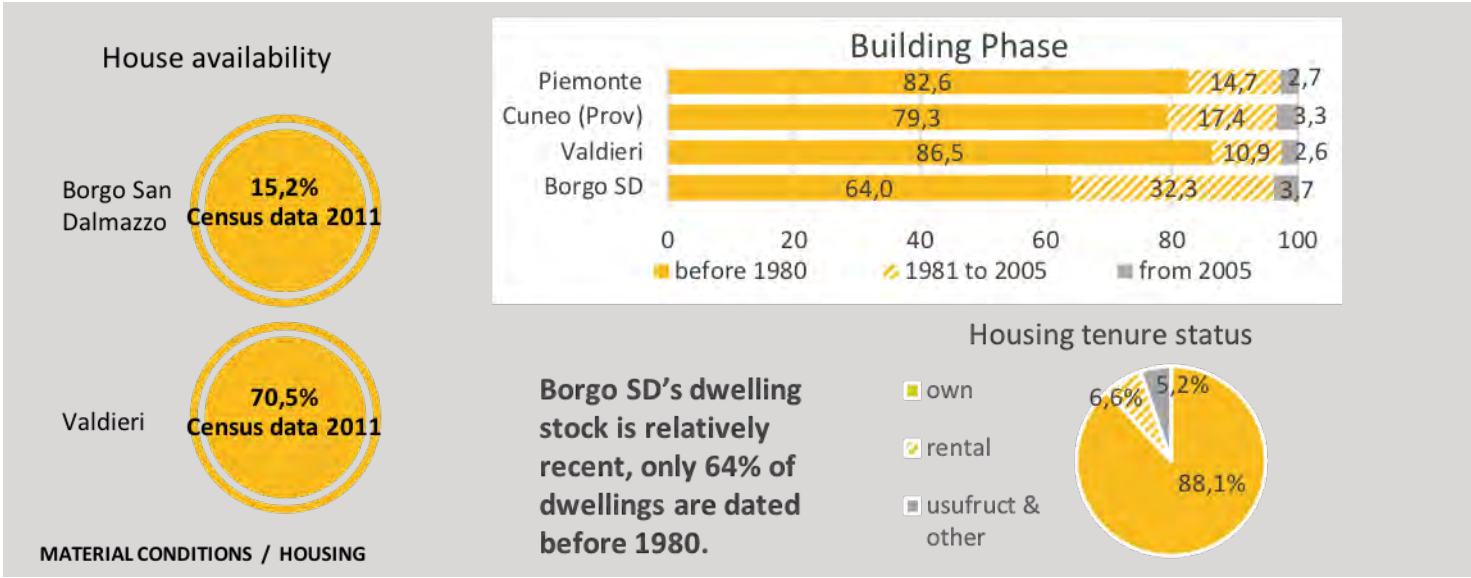
With regard to the first aspect — perceptions of local actors about the regeneration of the industrial site — the experience we have gained enables us to recommend the Visual Choice Experiment tool[10]. This tool reveals the sentiment of the local population regarding the proposals to regenerate the decommissioned areas.

These proposals should be presented appropriately (figure 3, page 84), be well distinguished, and refer to perspectives of transformation with clear actual references. In trAILs, for example, the Visual Choice Experiment tool was administered to local communities as part of the socioeconomic survey to assess the decommissioning, starting with proposals developed by project teams in the Department of Landscape Architecture at the Technical University of Munich. The design proposals refer to three possible alternative and mutually exclusive scenarios: a conservative scenario, an intermediate one, and a radical-transformative one.

The frequency distribution of the scenario choice produced by the Visual Choice Experiment already provides valuable indications for political decision-makers regarding the directions to imprint on future local development. The heuristic effects unfold completely, however, when correlated with the perceptions of the effects — positive or negative, economic and social in general — that regeneration of the site may have on the future of the community. From this perspective, the essential aspects we recommend considering regard:

- the general effects that individuals imagine the regeneration may have, positive, negative or no effect, even for interest groups such as younger generations, the whole community, only owners of the concerned areas and so on.
- the priorities that a hypothetical transformation process should develop: creation of new jobs, environmental protection, conservation of identity, and local cultural heritage.

figure 2: Example of economic measures.



Information of this type allows first-hand data and analysis to be produced regarding the community's perceptions of processes that political decision-makers may activate for the future of the decommissioned areas. A participatory, shared approach is ultimately strongly advised. This approach may also be enhanced by using qualitative and ethnographic techniques to collect information about ideas of the future held by the social actors involved: the local population, important witnesses, and interest holders in general.

Conclusion

Assessing the socioeconomic impacts of industrial decommissioning in Alpine areas and the effects on the people is a process of fundamental importance for adequately framing the design of the future of the interested communities. It constitutes an essential tool for gathering the perceptions of social actors and provides information for political decision-makers and moral and material entrepreneurs capable of orienting future choices.

The method suggested focuses on some essential keywords that, in the trAILs project, have yielded effective results. Firstly, the participation of actors and their involvement in the various steps of the process is key. Secondly, from the methodological point of view, we recommend a mixed methods approach that adequately and effectively integrates approaches and disciplines, such as sociology and economics above all, but also territorial planning. Lastly, an effective analysis of the social effects of industrial decommissioning should be adequately positioned in a diachronic sense,

figure 3: Example of the Visual Choice Experiment

Preference for future scenarios

VISUAL CHOICE EXPERIMENT

"Fižič Alpine Production"
Radical scenario

"Giant Meets King"
Conservative scenario

"Productive Waiting"
Radical scenario towards tourism

"Ribbon at the Foot of the Alps"
Radical scenario towards sustainable development

considering the past, present, and future of the communities involved.

These tools and approaches, organized into methods and techniques of investigation and social intervention, will provide all actors involved with an overall analysis of the social, economic, and cultural effects deriving from processes of post-industrial transition that massively affect territories such as those overlooking the Alps[11].

Endnotes

1. Modica Marcello, Weilacher Udo., "Post-Mining Landscapes in the Alps. Towards an integrated reclamation approach", in Planerin, n. 3-20, pp. 15-17, 2020; Modica Marcello, "Industrial Brownfield Sites in the Alps. A first Quantitative Overview and Potential Implications for Regional Development", in Journal of Alpine Research-Revue de géographie alpine [online], 107-1, 2019, URL: http://journals.openedition.org/rga/5298. Retrieved on: 14/10/2020.

2. Salsa Annibale, I paesaggi delle Alpi. Un viaggio nelle terre alte tra filosofia, natura e storia, Donzelli, Roma, 2019, p. 78. Unless otherwise stated, the translation is ours, here and elsewhere.

3. Touraine Alain, La société post industrielle. Naissance d'une société, Denoël, Paris, 1969.

4. Migliorati, Lorenzo, Veronesi, Liria, "The Consequences of Modernity in the Deep Europe: The Transformation of Industrial Landscapes in Alpine Regions", in Italian Sociological Review, 10 (1), pp. 1-29, 2020;

5. Halbwachs Maurice, Les cadres sociaux de la mémoire, Alcan, Paris, 1925 ; Alexander Jeffrey, Trauma. A social Theory, Polity Press, Cambridge, 2012.

6. Alexander, J.C. (2012), Trauma. A Social Theory, Polity Press, Cambridge;

7. Berger-Schmitt, Regina, "Considering social cohesion in quality of life assessment: concept and measurement", in Social Indicators Research, 58, 403-428, 2002.

8. Mutti, A. (1998) Capitale sociale e sviluppo. La fiducia come risorsa, Il Mulino, Bologna;

9. Pollini, G. (2012) "Appartenenza territoriale nelle comunità rurali" in Dendronatura, 33, 1, pp. 10-20;

10. Häfner Kati et al., "Assessing landscape preferences: a visual choice experiment in the agricultural region of Märkische Schweiz, Germany", in Landscape Research, 43, 6, pp. 846-861, 2018;

11. For further information, see www.postindustrialps.eu. 14/10/2020.

Environmental assessment

JOHANNES KOLLMANN, KATHARINA STROBL, MARKUS BAUER

Ecological value of Alpine brownfields

Brownfields are ecologically valuable, because they often host a wide range of habitats within a small area, and can support a high level of biodiversity, including rare and endangered species[1]. During active industrial use, brownfields are disturbed by for example, traffic, construction work or soil deposition, which can result in a variety of substrates. For instance, sandy soils can occur next to compacted soils and anthropogenic pollution of oil, heavy metals, or coal. When an area is abandoned, a series of vegetation types develops and succession takes place (figure 1, page 87). Most brownfields simultaneously support several successional stages that attract a large variety of wildlife[2]. Thus, a brownfield site can enrich the local or regional biodiversity, especially in poorly structured and intensively used landscapes. There, brownfields can serve as an alternative habitat for species, whose natural environments have been degraded or destroyed. For example, the endangered toad *Bufo viridis* has its largest populations in railway areas in Germany. As the Alps themselves are a hotspot of biodiversity, the ecological role of brownfields remains an open question. Moreover, since industry is mostly located in (narrow) Alpine valleys and thus, brownfields can prevent species moving along the valley or act as a wildlife corridor. Either way, their potential ecological significance should not be overlooked in the transformation process.

In the Alps as well as in the lowlands, abandoned industry can pose risks to future use, but has also the potential to mitigate future challenges. Some types of industry could contaminate soil, water, or air. Mining, in particular, often creates steep slopes and bare soil, which are prone to erosion, potentially affecting the safety of site users, which seems particularly relevant in a mountainous context. Moreover, brownfields in Alpine valleys might suffer from flooding, which is predicted to become more common due to climate change. Thus, climatic, hydrological and soil conditions of brownfields as well as biodiversity are largely influenced by humans[3]. Such "novel ecosystems" often host invasive alien species, which might spread and threaten pristine or near-natural habitats. They can also represent a risk to human health or the economy, for example cause allergies, or damage constructions. While these ecological threats affect brownfield transformation, considering them early in the planning process, helps to develop suitable management strategies and to save resources.

By providing ecosystem services, the natural environment of a brownfield can support the transformation in addressing present threats. In fact, brownfields offer benefits to people. First, natural resources are a basis for economy and well-being[4]. More than that, there are more direct services to humans. Within a matrix of sealed surfaces, green areas can regulate the microclimate and therefore locally mitigate climate change[2]. Vegetated areas reduce erosion and post-industrial wilderness can also provide a nature experience to humans. Thus, brownfields have an enormous ecological potential, that concerns not only their current state, but is extremely valuable, when aiming for their transformation.

Brownfields need to be transformed due to social, economic, or ecological reasons. Therefore, the impacts of future use on the post-industrial wilderness areas described above, their associated species and ecosystem services need to be considered. In most European countries, it is necessary to estimate how development projects, like construction of factories or roads, affect legally protected species and habitats. If the impact cannot be avoided, it usually needs to be compensated by establishing new protected areas or by restoration[5]. Besides these legal requirements, a sustainable transformation needs to assume its ecological responsibility, for example by encouraging endangered species or reducing flood risk or erosion not only for the site itself, but also for

figure 1: Series of vegetation types. Succession.

adjacent communities. Furthermore, in some cases an economic or social transformation might not be possible and the only sustainable future for the site is an "ecological transformation". In this case, the environmental setting will be particularly important.

Therefore, an ecological assessment of Alpine brownfields should aim at identifying the present ecological value as the basis for conservation, restoration, or transformation. Specifically, we advise to (i) provide an overview of the ecological status quo in terms of habitat and species diversity as well as ecosystem services, (ii) develop recommendations for managing areas of high ecological value in order to ensure their conservation and/or (iii) identify degraded, polluted or damaged areas as well as potential measures for their restoration.

Analysing the ecological value

The environmental assessment of Alpine industrial brownfields should be divided into two main parts: the first one covers plants, animals, and their habitats, and the second one (soil) pollution and contamination, flood and erosion risk.

The first part focuses on biodiversity hotspots and the connection between those hotspots. A biodiversity hotspot is an area with many species and/or rare and protected species. The amount of species for plants is measured in relation to a certain area, mostly a quadra of about 5 x 5 square metres. To get a most comprehensive study of the site's biodiversity, the quadras are established in different habitat types.

figure 2: Example of an early successional state in Tržič.
figure 3: Assessing vegetation diversity on brownfield sites.

Habitat types can be differentiated according to plant structures such as trees, shrubs, herbs, and the proportion of bare soil (figure 2 and 3). Problematic species, such as invasive alien species, are assessed over the whole site and either individuals or their cover per habitat type and area are recorded.

Among animal species groups, we advise to carefully select the most representative ones for the respective site according to habitat preferences, meaning quality, quantity, dispersal and distances. Suitable groups are birds, butterflies, or reptiles. Besides identifying the present species, such as butterflies (figure 4, page 89) and counting individuals, it is important to map the habitat structure, for example for reproduction or hibernation. A biodiversity hotspot is not only characterised by many species but also by rare species. The latter are often legally protected and therefore significant for a transformation. For some of them, a different mapping approach is necessary. First, potentially occurring protected species and their habitats have to be identified. For example, old buildings are suitable for breeding birds or bats, and ponds for amphibians and dragonflies. Afterwards, these areas are assessed in a more detailed way, potentially including traps or technical devices such as bat recorders.

figure 4: The red-veined darter (*Sympetrum fonscolombii*) was found in L'Argentière
figure 5: Catch and release of butterflies. Here the Wall Brown (*Lasiommata megera*)

The local biodiversity of Alpine brownfields must be set in context to the surrounding landscape to identify its value for the regional biodiversity. Therefore, the surrounding area must be mapped for other brownfields, urban areas, or similar pioneer habitats in the more natural landscape. Furthermore, corridors between these habitats must be identified. Corridors are suitable structures which can be used by species to move from one area to another. The resulting map enables an assessment of the isolation of the project site, its uniqueness within the landscape and its value for the regional biodiversity.

The results of this biodiversity analysis (habitats, species richness, rare, protected or problematic species) can be combined, leading to a map with biodiversity hotspots, that should preferably be conserved, and less well-preserved areas, that should be restored or used for other purposes.

The second part of the ecological assessment focuses on environmental risks. Potentially polluted soils should be assessed, and soil samples of these areas must be analysed. Concerning flood risk, any sealed area, and any obstruction of the river on the site must mapped. At a regional scale, the site must be evaluated to discover whether it is a bottleneck for river flow through particular narrowing of the riverbed. Erosion risk is estimated by assessing vegetation cover and surface inclination.

On this basis, risks for future use can be evaluated and necessary management measures can be defined, while

figure 6: Map of different habitat types on a brownfield in France (different colours)

creating links to biodiversity conservation or restoration. In terms of flooding for example, river restoration could be a goal. When enlarging the riverbed to its (near-)natural state, water retention areas are increased and flooding risk for downstream communities is decreased.

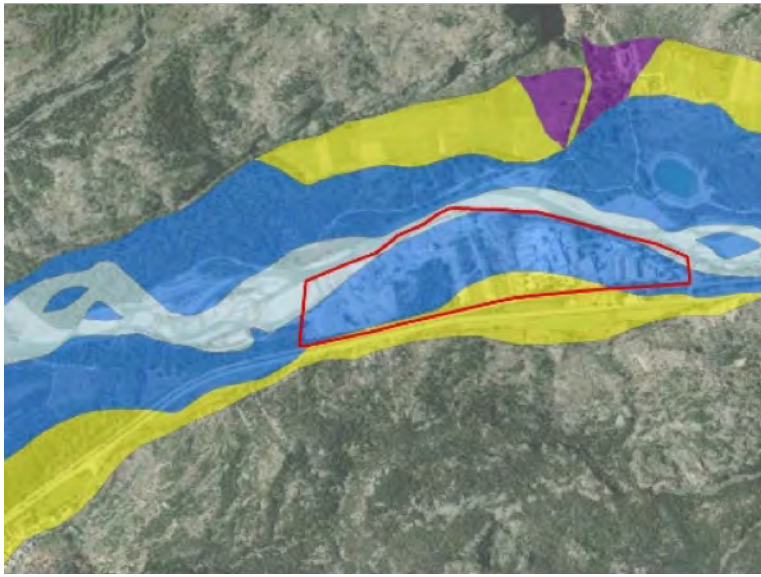
Such a measure could also have a positive interaction with the biotic part by improving corridors for species, as rivers and riverine vegetation are suitable dispersal structures for many species.

Environmental potentials and threats

As an output of the first analysis, we advise displaying the results in a map of habitat types (figure 6). It shows a mosaic of different successional stages, from pioneer vegetation to woody vegetation with trees (figure 1, page 87). A mosaic of different habitats is a prerequisite for a high degree of local biodiversity, especially for animals with requirements for varying sub-habitats, such as lizards or butterflies and their larvae.

This should be supplemented by another map on a regional scale where other brownfield sites or habitats with similar species are marked. By displaying the distribution of habitats and their connections along corridors, we can clearly see the ecological role of the project site for regional biodiversity. It shows, if the area is an important refuge for certain species or species groups such as pioneers, or if it is an important stepping stone for animals between similar areas.

figure 7: Map of butterfly species densities within an Alpine brownfield in France (purple area=high density), and lizard and dragonfly occurrence (points)
figure 8: Map of potentially flooded area (blue = frequent)



Species lists of plants and different animal groups give a first impression of the site, but it is even more important to identify biodiversity hotspots. Frequently, such areas are intermediate successional stages where many (flowering) plant species and butterflies occur (figure 7). Though, the occurrence of dragonflies and lizards is a strong clue to valuable habitats. For invasive plants or animals a corresponding map indicates areas with a need for management. When analysed together, these maps point out (i) areas with high ecological value (biodiversity hotspots) which should be preserved, (ii) areas with a high environmental potential such as potential stepping stones, which should be further developed, and (iii) areas with a need for restoration or management, for example because of problematic species and poor biodiversity.

The second analysis results in one or several maps of environmental threats. For example, an analysis of flooding shows that the site is situated in an area prone to flooding (figure 8). Maps with a smaller scale are produced for erosion risk and potentially contaminated areas. Thus, these maps point at a need for management or restoration, for example contaminated areas need to remain untouched or be carefully decontaminated..

figure 9: Spontaneous vegetation on the premises of the abandoned power station in Eisenerz-Münichtal

Conclusion

In conclusion, an environmental analysis can identify ecologically valuable sites at a regional and local scale, as well as environmental potentials and threats. Its results are the basis for implementing conservation and restoration into the transformation process. For example, if the project site hosts regionally rare habitats and species, particular attention should be paid to the ecological perspective during transformation planning. One possibility is to use certain species or species groups as a target group for animal-aided design. This is an approach which tries to combine biodiversity with landscape architecture[6]. One example for adapted management or active restoration is the reduction or increase of mowing intensity. It can be useful for increasing species diversity or protecting certain species. Another promising approach is seeding species-rich seed mixtures for establishing further regional flowering species. All in all, the environmental assessment of Alpine industrial areas is important for identifying potentials for conservation and reducing environmental risks. The results can guide the transformation and design process.

Endnotes

1. Kattwinkel, M., Biedermann, R., Kleyer, M. (2011): Temporary conservation for urban biodiversity. Biological Conservation 144, (9), 2335–2343.

2. Mathey, J., Rößler, S., Banse, J., Lehmann, I., Bräuer, A. (2015): Brownfields as an element of green infrastructure for implementing ecosystem services into urban areas. Journal of Urban Planning and Development 141, (3), A4015001.

3. Lundholm, J., Richardson, P. (2010): Habitat analogues for reconciliation ecology in urban and industrial environments. Journal of Applied Ecology 47, (5), 966–975.

4. European Comission (2015): Report from the Commission to the European Parliament and the Council – The mid-term review of the EU Biodiversity Strategy to 2020, Brussels.

5. Moilanen, A., Kotiaho, J. (2018): Fifteen operationally important decisions in the planning of biodiversity offsets. Biological Conservation 227, 112–120

6. Weisser, Wolfgang W. and Hauck, Thomas E. (2017): "ANIMAL-AIDED DESIGN – using a species' life-cycle to improve open space planning and conservation in cities and elsewhere" in: bioRxiv, 150359

Developed tools

TOMAŽ PIPAN, MANCA KROŠELJ

One of the main challenges for WPT2 was how to develop a unified, replicable and scalable co-assessment process in which different thematic perspectives for different disciplines could assess the local conditions and develop their own respective conclusions for the four AILs pilot sites. The framework of WPT2 gave a unified basis for five very diverse thematic areas of assessment: existing policies assessment, spatial and landscape assessment, social-demographic context assessment, economic context assessment and environmental assessment. It gave the professions a common and comprehensive methodological framework for investigating, analysing and presenting the multidisciplinary results.
In order to achieve a unified assessment procedure, various methods and tools were used in an experimental design, one pilot site at a time. Following the fieldwork at each pilot site, feedback from partners was collected and tools and methods were adjusted for the next site visit. In addition to the reflection on the methods of assessments, each of the research partners was responsible for providing the results according to their profession, although a common template was used. This helped to achieve three goals: 1) to additionally structure results for comparison, 2) to record their feedback on the changes to the assessment across the four pilots, and 3) to gather feedback on the usability of the results for the regional partners and local stakeholders[1].
The tools used to achieve the above were diverse. In the following section we briefly touch on the most interesting tools and methods used.

Site Visits and Reflection Sessions
The co-assessment procedure was envisioned to consist of four site visits of two days, where partners could deepen their knowledge by experiencing the actual conditions of the pilot sites. The first day, the site visit and initial meeting with the stakeholders (figure 1, page 95) was organized and managed by the regional partner. The second day, titled "Reflection Session", shaping the methodological aspect of WPT2, (figure 2, page 95) was organized by the University of Ljubljana as the WPT2 lead.

The site visits proved to be one of the key aspects in the co-assessment procedure of AILs as they allowed partners to experience the intangible dimensions of the area, its town, people and atmosphere, as well as do the research-related activities. The site visit day was adjusted according to prior experiences and considered the sites' specificities and contexts. For example: limited access to the Italian pilot site, unfavourable weather conditions in Austria, due to heavy snowfall the day before and a cancelled physical site visit in Slovenia due to COVID-19. The latter was the unfortunate last pilot case, for which the procedure was adapted to be executed virtually with a pre-recorded site visit and online meeting of the stakeholders.

Site visits
These sessions were an attempt to bring the five diverse assessment disciplines into a common framework for the purposes of WPT2 outputs. The 2- to 3-hour workshop sessions were designed to facilitate four aims: 1) to allow discussion and reflect on the assessment findings, 2) to present to the partnership the challenges and opportunities of each assessment method, 3) to monitor the methodological transformation of each assessment, and 4) to bring some lateral cohesion to the assessments for the purposes of the final Assessment Tool output. Discussions were held in groups and ex cathedra based on the review of previous assessments done by the lead partner. The process was framed so as to encourage synergies. For example, the two partners were able to develop a common framework for their research (spatial and landscape assessment). Yet on the other hand, the well-integrated research into the socio-economic context was challenged to be reviewed separately. With a cooperation

figure 1: The first site visit in Eisenerz. Wlaking around the site with regional parter and local stakeholders
figure 2: The first Reflection Session workshop held in Eisenerz was an introduction of the variety and scope of thematic assessments that will be undertaken in the following years of the project

between the research departments of different fields on one hand and regional partners as advocates of their pilot sites on the other, internal discussion sessions yielded many interesting results.

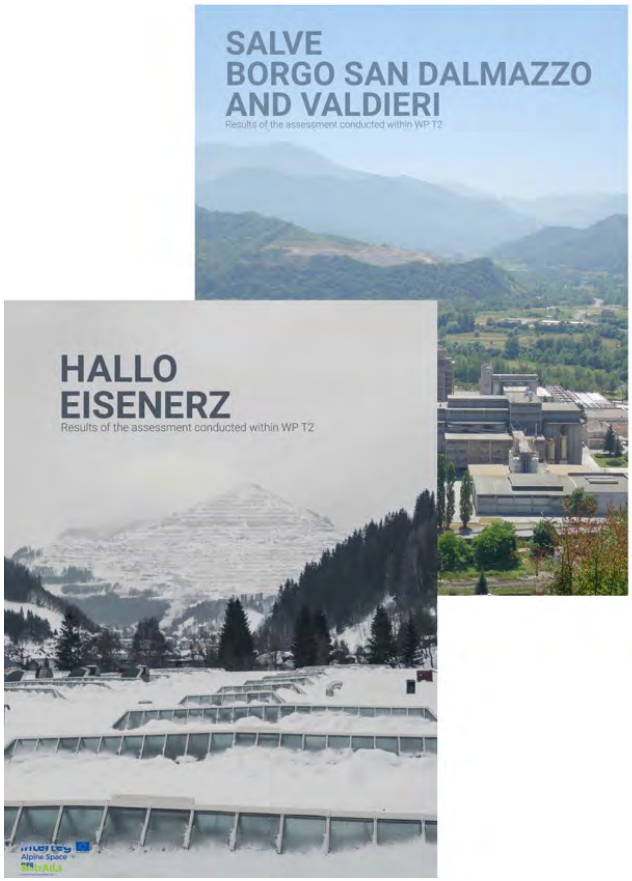
Assessment Book and its derivatives
During the first co-design workshop in Eisenerz, it became clear that in order to successfully convey the results of the multidisciplinary assessment to the stakeholders, the partnership has to reconsider the communication of these results. These outputs only marginally affected the WPT3 co-design work as they were not sufficiently prepared in a manner suited for use in a workshop environment. The task was how to simply and efficiently convey the essential findings of the assessments and how to format these to be operational as a common ground for the WPT3 workshop discussions. For this, three concepts of varying detail were created. The main was the Assessment Book that required the distilling and reviewing all of the assessments and making them legible to the public. The Assessment Poster and Assessment Cards were derivatives of the book and tested as additional didactic tools for the workshop format.

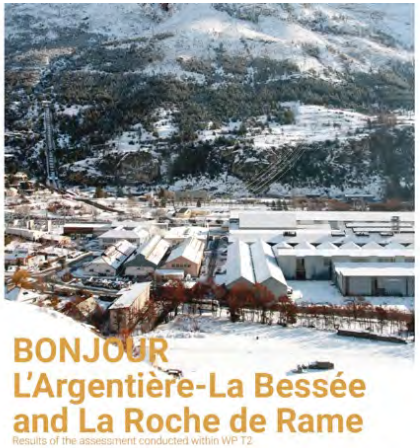
The Assessment Book was a result of a feedback process between the academic partners, the editors and the regional partners in order to streamline the content and design so that the information was easily digested, visually appealing and operational. The Book concept through its iteration in four pilot sites and four languages became one of the useful outputs for the regional partners and the municipalities.

figure 3: The final Assessment Book 'Živjo Tržič' in the Slovenian language for the fourth and final pilot site Tržič, Slovenia. Each of the books was written in English and the local language, making a total of eight books.

Each of the four books was designed to communicate the findings of the project partners in the most practical manner and, most importantly, to communicate these findings to the local stakeholders just before the project's co-design workshop. For this, the book addresses the reader on three levels. Firstly, it introduces the project's events that happened on the pilot site, such as the two days of site visits and the fieldwork. Secondly, it presents the main findings from thematic assessments in a condensed and visually appealing way and lastly, it invites the reader to collect his or her own impressions and concerns and share them at the project workshop. The main emphasis is still on the assessments themselves. The book highlights the synthesis of the results which are structured in four themed chapters: existing policy framework, socio-economic context, spatial and urban layout and environmental view. Each of the chapters starts with a basic explanation of the assessment results, introduction and summary, followed by three to five main potentials and problems the analyses identified. Potentials and problems are explained with the use of recommendations and any further research that needs to be done on the specific subject. The potentials and problems are also depicted with graphical representations and highlighted in the a form of maps, plans, graphs, charts or with other infographic, all with the intention of providing efficient access to the information (figure 3 and figure 4, page 97).

figure 4: Cover pages of the other three Assessment Books: 'Hallo Eisenerz', 'Salve Borgo San Dalmazzo and Valdieri' and 'Bonjour L'Argentière-La Bessée and La Roche de Rame'.





Share your thoughts with us

Your ideas and concerns are an integral part of the project trAILs. That is why project partners kindly invite you to share your thoughts with us. Let us jointly discuss the future scenarios of the Münichtal site and surrounding areas of Eisenerz.

Notes

The Assessment Cards

They are a tool borrowed from the gamification approach where game elements are applied to serious problem solving. The cards were a derivative of the Assessment Book, used by stakeholders, moderator and project partners at the workshop to stimulate a discussion (figure 5, page 99). Each assessment had three to four cards that could be either an identified problem or an identified potential of the site as per the assessment conclusions. The idea was that the cards would give the stakeholders a quick way into the assessment material and to operationalize it through discussion about the cards on the workshop tables. Thus, the moderator could identify the most pressing topics picked by the stakeholders to further explore and reference with the use of spatial maps and test-desings. The first use of cards proved too complicated for various reasons. From the fact that the stakeholders get too fixated on individual cards, or the language barrier. In addition, the moderators set complicated rules for their usage. The cards lacked a simpler structure, with clearer aims and a better connection to the test-design of the WPT3.

An adjusted version of the cards was used at the workshop in France, where a simpler poster was designed to support a discussion with only a few potentials and problems. It proved to work better, as the poster was in a sense clearer, one could see all the topics set for a discussion, although it had fewer gamification elements and more infographic elements from the Assessment Book (figure 6, page 99).

Assessment Tool

The Assessment Tool represents the main output of the WP T2. The target groups for the tool are the public authorities, business support organizations and NGOs. More specifically the municipality officials, the site owners and others who would like to understand what type of work needs to be done in order to holistically assess an AIL. The tool is a "streamlined" version of the academic assessments. It is designed in such a way as to give the users a feel and understanding for what each assessment does, what are its results, how work intensive it is and what it can offer. Additionally, the tool gives a way to test which assessments are needed for their specific problem.

Each assessment is framed so as to show users how certain questions can be solved rather than how to find new ones. The tool is not meant to produce expert-level results by the users; rather the goal is to give local administration and municipality officials a way of framing their problems more effectively and to give them a glimpse into different assessments. The tool is an incentive to start an expert-supported transformation process of AIL.

On a technical level, the Assessment Tool is set up as a "cook book" as it gives a "recipe" for how to assess the AILs (figure 7, page 100). That means it is a designed brochure with questions, guidelines, thick boxes, diagrams, graphs, pictures and step-by-step procedures. The final goal is making the manual as user friendly and didactic as possible. It uses a descriptive language that is less expert-specific so that a wider audience can understand professional concepts. Depending on the local needs, wishes or understanding, the book can be used in any order by selecting an assessment the user is the most interested in.

The book is structured into four segments of assessments, these being: policy assessment, socio-economic assessment, spatial assessment and environmental assessment. These together create an acronym PoSESE. The idea of the manual is to "possess" the knowledge of a site's potentials. To transform it into a liveable and sustainable place, being economically viable for the local and global community through existing resources. The Assessment Tool has four segments.

figure 5: Explanations of the Workshop Assessment Cards by Tomaž Pipan
figure 6: The Assessment Poster at the workshop table

1. Envision
The envision section talks about how to approach the assessment of AILs from the point of view of an owner or the municipality. Here, the four assessments are explained regarding the way they help to uncover a good set of potentials that any industrial landscape can offer.

The policy assessment explains what are the potentials of institutional resources for the site. The socio-economic assessment looks at what is the potential of local people and the local economy. The spatial assessment uncovers what is the spatial potential of the site and the town. The environmental assessment shows the interesting, yet sometimes overlooked environmental potential of wildlife species on the site.

2. Define
This is one of the key sections. Through this section the user identifies the assessments that are needed in their particular example. The user can, through a simple decision-making tree, tailor and understand the different assessments that are suitable for their particular AIL. This is done by way of a diagram and simple questionnaire (figure 8, page 101). These guide the user to select the appropriate assessments for their particular situation. Through a guided questionnaire, they can define key topics that are important for their particular site, or the users can follow one of the three recommended paths of transformation.

figure 7: A graphical explanation of how the Assessment Tool works and what are its main sections

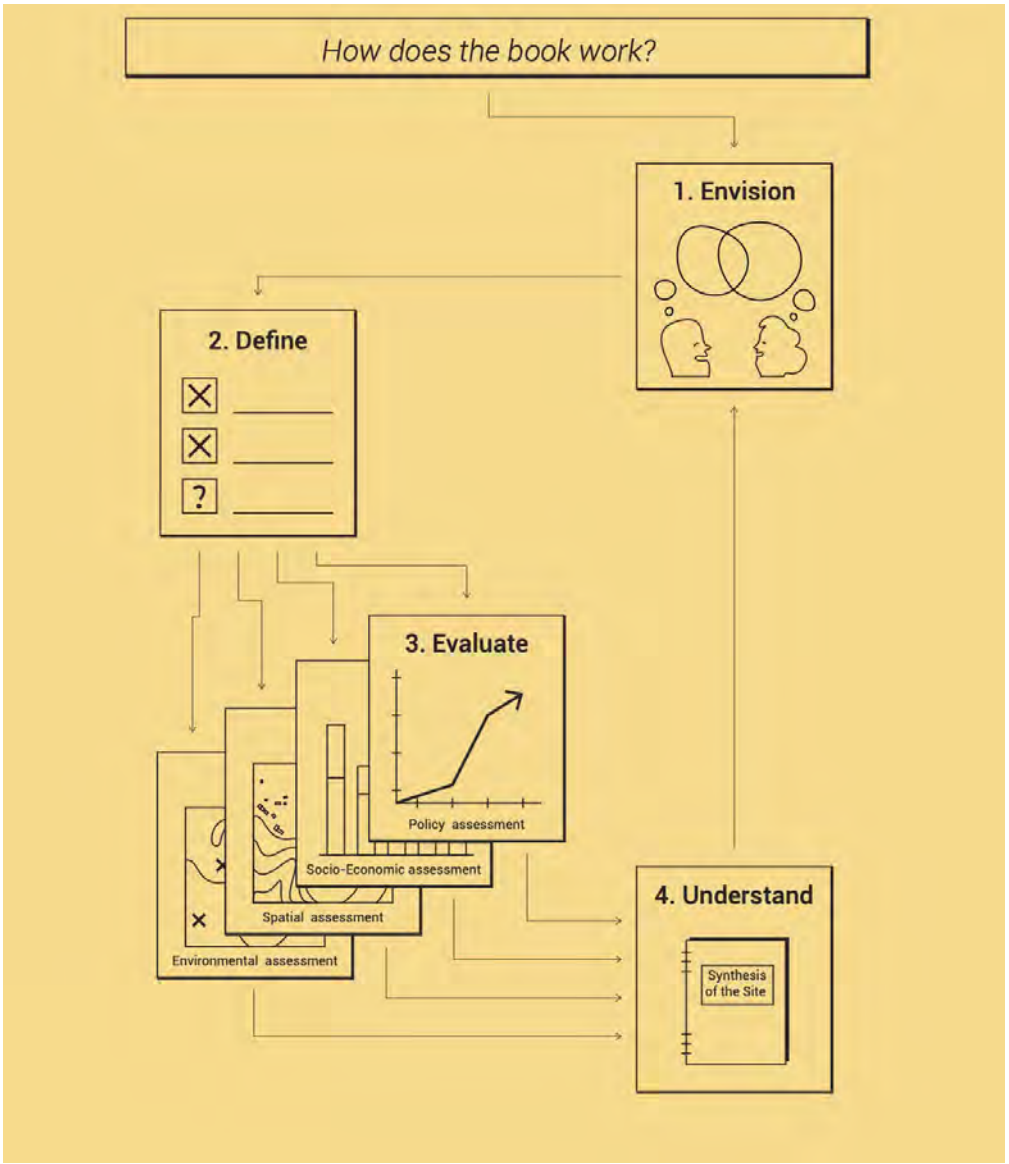


figure 8: An example of how different types of transformation scenarios need to address different number of questions.

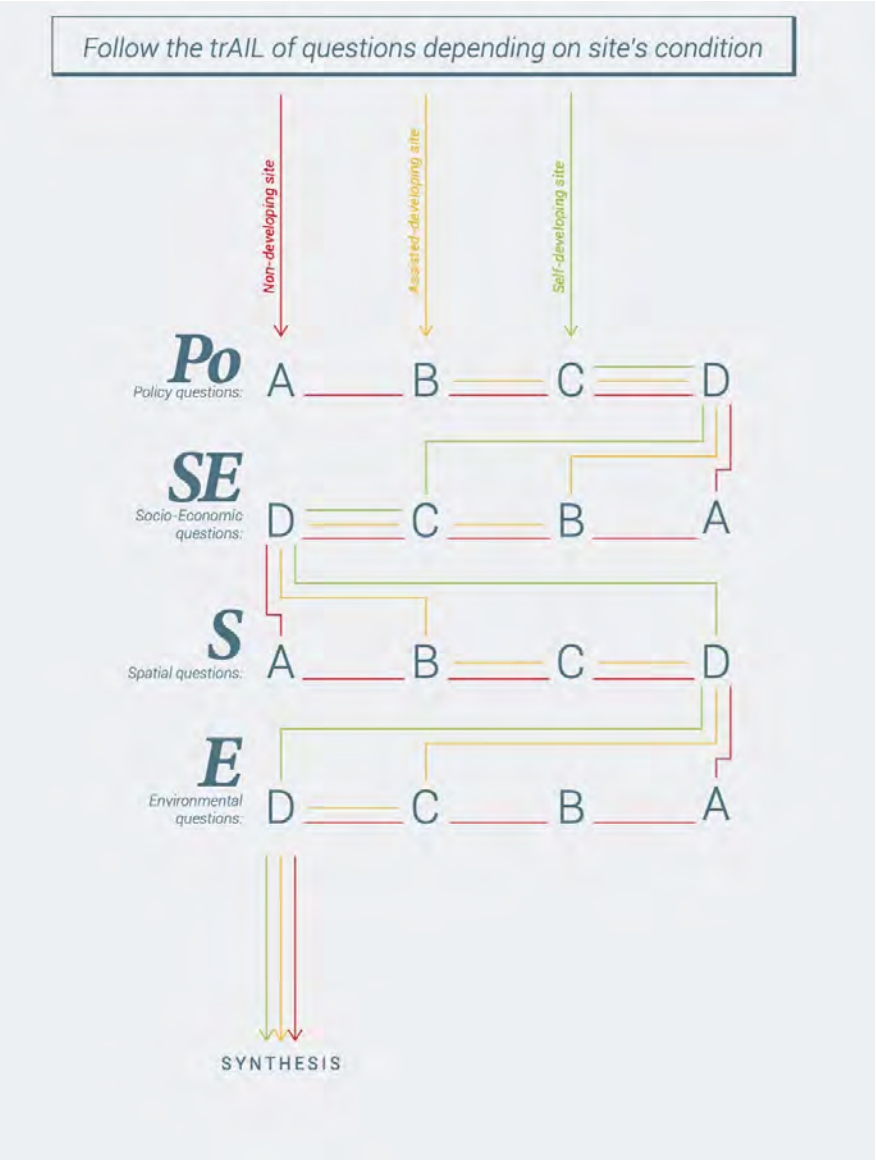


figure 9: An example of how to score what questions are important for the user

What actions would you like to take?

The uses of policies are various. Here are a few Actions that the Policy Assessments can help you achieve.

1. Look at the Actions on the left and decide how important each is (Low, Medium, High).
2. Look on the right which Questions are required for the Action to be achieved.
   You can also read about each Question in the following table.
3. At the bottom of the spreadsheet, add the Xs up to identify the Questions you need to tackle first.

Actions the Policy Assessment can help with	Action importance			Question needed			
	Low	Mod	High	A	B	C	D
Identify implementation gaps and suggest new policy recommendations to remove them.				✓	✓		
Test the operability of levels and suggest changes of decision-making process.					✓		
Identify if any sectorial policies are in conflict before starting the project.				✓	✓		
Identify your conversation partner for incentives when making redevelopment project.				✓	✓		

3. Evaluate
This section is the second key section. Here, each assessment and each of its main questions are presented in detail. The user gets an overview of each method, how much time is used, what kind of resources (and experts) they will need, and what kind of results they can expect.

The user can again tailor this assessment by choosing the "questions" that are most pertinent for their AIL (figure 9, page 102). Each of these "questions" are then presented and explained; what are they good for, how to use them, what expertise is needed to answer them, how much time is needed to answer them. Each of the "questions" is didactically illustrated with an example from our pilots so the user has a sense of what kind of output to expect.

4. Understand
This is the final part of the book, a synthesis of the above process. The users are encouraged to write down their process of assessment and to reflect on what are the potentials of the site based on the quick questions they chose in the previous chapters. They are encouraged to write down the weaknesses and strengths of the site based on assessment questions that they carried out and make a plan of actions.

Endnotes

1. The execution of the policy is different from regular framework due to collaboration between University of Ljubljana and the regional partners. Regional policy assessments were performed for all the pilot cases at once, producing four regional reports, in the majority by the regional partners supported by a designated research partner. A comparison analysis was thereafter conducted by the research partners from the University of Ljubljana that evidenced key recommendations and findings for future research on the topic of AILs and project development.

Testing ::

106 What is test-design and how it works

112 Planning recommendations

What is test-design and how it works

PAOLO GALUZZI, ELENA SOLERO, PIERGIORGIO VITILLO, ANDREAS DANGELMAIER, MASSIMO GALLUZZI, MARTIN GARCIA PEREZ

Reconversion in fragile territories

In contrast to common opinion, industry has shaped the social and environmental features of many Alpine landscapes as well as the economy. The end of industrial production has not only left behind a "negative" ecological and functional footprint, usually extending beyond the individual sites, it has also marked the end of an age of wealth based on strong and reciprocal relationships between the industry and its community. The resulting multi-layered landscape, shaped by local culture and knowledge and framed into centuries-old topographies, is undergoing radical change.

The shutdown of industries has opened up a new phase, revealing all the limits and problems of functional reconversion in contexts that have been abruptly weakened from an economic point of view (the crisis of company towns), or in terms of society (the shrinkage of population) or the environment (the presence of contaminated waste inherited from previous production cycles). However, abandonment can be turned into an opportunity when the reconversion addresses three main issues or objectives: mitigating the effects of climate change, supporting sustainable economies, and improving ecological networks and ecosystem services.

Severe and ongoing climate change will increase the impact of risks from the natural world, in particular those related to water systems and flooding. In the past, water and its uses have shaped the production system throughout the Alps, being the driving force of except in the subclaus which defines many factories and, more generally, of these territories. The question today is how to combine the capacity to manage natural risks with the development of new economies.

With this in mind, fragile Alpine regions can be turned to real Living Labs for testing the European Green Deal, a plan aimed at supporting technological innovation and responses to environmental crisis, including fifty actions, for a total of about 1,000 billion euros of investment (planned for the next ten years). Taking care of the region and its landscape heritage brings with its exciting new perspectives for employment by supporting enterprises and skills capable of dealing with social and economic changes. This also fosters the growth of a sustainable and locally oriented economy

Finally, the conversion of brownfield sites can be an opportunity to build strong ecological networks, where the active protection of large-scale green systems can help to enhance the specific characters of natural and historical landscapes, even creating new cultural and environmental geographies and itineraries. In addition, Alpine spaces have great potential to provide ecosystem services. Forests, in particular, play a crucial role in water and air purification, in preserving biodiversity by allowing animals and wild plants to evolve, and in climate stabilization.

An alternative approach

Over recent decades, the most complex and dynamic urban contexts have experienced a long, now completed, season of real estate-based projects. Similarly, even fragile areas of low-economic-intensity have often become the object of the ungoverned addition of plans and interventions, fundamentally lacking an overall vision and a general strategy. Starting from this awareness, the work on trAILs pilot sites has been based on a strong integration of the history and culture of local communities with the physical character of the local area. The intent was mainly to embed resilient options into real situations and existing constraints in order to meet the ambitions of local communities while supporting them in setting clear programmes. We are experiencing new living conditions, extremely evident in Alpine regions, where the effects of climate change and environmental fragility

figure 1: Roundtable discussion in Eisenerz
figure 2: Roundtable discussion in Borgo San Dalmazzo

are often combined with downward demographic and economic trends. In this framework, a design-based approach represents a suitable methodology for providing concrete support to a collaborative process able to coordinate many actors and actions. In this respect, design-based alternatives aim at showing a range of different opportunities and defining the related actions. Taking a design approach is also effective for embracing divergent perspectives and multiple points of view, providing for the communities a reference context with which they can identify. This approach indeed promotes the development of "collective capabilities". The conditions of uncertainty that today qualify space and time require new ways of conceiving design activities: the goal here is to outline contextual frameworks able to incorporate the long-term changes connected to urban and landscape transformations. It is therefore not simply a question of focusing on different strategies produced by different design alternatives, but more of developing a process that identifies shared views for the future.

For this reason and to this aim, trAILs implemented what is known as the test-design procedure. Based on hard facts and data from the context, a series of design "explorations" are outlined by planners and designers from the partner universities, with the aim of showing a variety of possible futures for the same site. The proposals, as "test designs", are then screened by means of a comparison matrix, in order to select the most significant ones for discussion with local communities and stakeholders. In a two-day test-design workshop, the evaluation of the selected test

designs was conducted jointly by local and regional experts and synthesized in a set of mutually agreed planning recommendations. The main goal of the test-design procedure is to provide a platform to enable discussion, that is, as an operative framework to help local communities to evaluate performances in the regeneration process.

Providing usable knowledge

The aim of trAILs is to provide usable knowledge by outlining appropriate and sustainable strategies for the transformation of Alpine brownfield sites. This call for giving particular consideration to the character and meaning of research procedures and their outcomes. Some keywords helped to direct the focus:

1. *Trans-disciplinarity.* In the test-design workshop, each discussion table is composed of participants holding different knowledge, such as sociologists, public policy analysts, ecologists, landscape architects and planners, each with their own vocabulary and approach. This serves to make the process open and interactive by radically questioning the ideas on the table and even experiencing "cross-fertilization" processes. Certainly, this is not a simple operation, but it is the right way to discuss designs in an interdisciplinary manner.
2. *Listening to communities.* Interaction with local communities is fundamental. This is done constantly in the process through in-depth video interviews, meetings and planned individual conversations. We believe that one of the most interesting research outputs is this profound participation of local communities, which enhances their planning capabilities as well as their territorial responsibility.
3. *Providing generative knowledge.* The research is mainly intended as an opportunity to set a dialogue between different areas of expertise, and to generate from that the design-based knowledge able to activate long-term transformation processes for deindustrialized Alpine communities. The test-design method is indeed meant to produce outputs that, thanks to their replicability and adaptability, can be easily transferred to other communities and territories.

Test design as a process

The test-design approach is an inclusive design process in which participation and confrontation can be practiced through different formats such as site visits, roundtables, workshops, dossiers, etc. As a starting point, an information and evaluation report with a multidisciplinary character and content – including socio-demographic, economic, spatial and environmental issues, legislation, planning constraints, etc. – is provided as a synthesis of the assessment phase. This report or dossier represents the "hard facts" with which the test design has necessarily to grapple. The test designs can be generated in various ways, for example through the direct appointment of design companies, consultancies or, as in trAILs, by means of higher education resources.

With regard to the latter option, the production of test designs for the project pilot sites has been developed by the partners universities in Munich, Milan, Vienna and Ljubljana through the direct involvement of landscape architecture and planning students. The test designs have highlighted and creatively reinterpreted the main features of the sites and the relationships with the context, here assumed as a necessary working condition. A selection of alternative test-design proposals was then carried forward, as a preliminary step to the subsequent test-design workshop with local communities and stakeholders. On this occasion, the design proposal was presented to the participants – local and regional authorities, associations, citizens' representatives, experts, etc.) and intensively discussed and evaluated with them. The purpose

of the workshop is to highlight the potential of the sites in terms of future development, starting from the identification of the site's key spatial, landscape and environmental assets and including their integration into existing redevelopment policies and strategies.

So conceived, the test design is a process of mutual understanding and learning, a valuable and unique occasion of dialogue (formal and informal) between different areas of expertise and different interests. The goals of the test-design workshop, which represents the core of the whole process, can be summarized as:

- to permit stakeholders and experts to meet around the same table, thus creating the best conditions for direct and interdisciplinary communication, as well as for an exchange of opinions, with full transparency, understanding and mutual trust;
- to identify and agree on the most important shared key issues for the future transformation of the site such as, for instance, increasing social infrastructures, fostering a more sustainable economic development, improving ecological and environmental systems, protecting and managing architectural industrial heritage and historical values;
- to provide concrete planning recommendations for the future of the site, as an output specifically designed for the communities involved.

The test-design method was developed by trialling this approach in all the four pilot areas, while adapting to the different contextual conditions and available resources. In Borgo San Dalmazzo and L'Argentiere-la Bessée, the methodology could be applied as planned, while in Eisenerz it was slightly simplified. Unfortunately, for the last pilot site in Slovenia (Tržič), the restrictions due to COVID-19 forced the project to implement a hybrid test-design workshop with only the stakeholders and the local partners meeting on site. Ultimately, all the four experiences proved to be successful each in their own way: many opinions, reflections and constructive proposals were expressed and debated during the meetings. The main phases of the test-design workshop are:

1. *Working tables*

   The aim of the interdisciplinary working tables – usually three in number, though the number can vary according to the participants, the characteristics of the sites, the complexity of the issues at stake – is to highlight the key issues for the proposed site transformation. Each working table focuses on one specific test design, selected from among the case system produced. In order to make it easier for everyone to discuss matters on a design basis, a set of helpful materials are also made available on the table: panels, assessment dossiers, the comparative matrix, aerial photos, maps of public or private properties and, in addition, a blank map useful for collecting or drafting ideas or proposals in a visual manner. The discussion is facilitated in such a way that each of the participants is required to focus on three different aspects:

   - perceptions of the former industrial site in the urban and regional context;
   - the issues focused on by the project as a result of the previous workshops;
   - the needs/expectations/questions aimed at achieving a regeneration programme for the area.

   The distribution of local stakeholders across the tables should be organized with the aim of mixing profiles and skills in order to encourage exchange between different

approaches, as well as to define by mutual agreement the priorities for intervention.

2. *Preparation of a strategic diagram*

   The conclusions from each of the working tables are collected in a strategic diagram (a preliminary, visual outcome), to be later presented and explained to the other working tables. The strategic diagram is a synthesis of the key elements that emerged from the discussion, as well as the first draft for development guidelines.

3. *Synthesis of approaches, key elements and orientations collected during the roundtables*

   As the last step of the workshop, the strategic diagram produced by each roundtable is presented to the plenary group (all the working tables reunited). The purpose is to compare the different outcomes and to summarize the different orientations emerging from the evaluation of the test designs. The strategic diagram indeed forms the basis for the definition of the planning recommendations, prepared after the workshop and representing the final outcome of an inclusive process.

Test-design workshop agenda

The success of the test design workshop is strongly tied to high-quality organization. Three useful steps in planning workshop events are:

1. *Select stakeholders*

   The selection of the thematic expertise and local knowledge to be involved in the workshop must encompass political and administrative stakeholders, as well as representatives from the economic, social, environmental and cultural spheres.

2. *Set the working agenda*

   The working agenda has to be as simple and as condensed as possible, possibly setting the workshop on a single full day to engage and involving the largest possible number of stakeholders.

3. Plan times and methods of the test design workshop, such as:

   Morning session

   Welcome and greetings; introduction of the stakeholders and participants involved in the workshop; introducing analysis and basic knowledge available for the areas; organization of working tables, arranged by theme or by type of stakeholder.

   Afternoon session

   Working session at the tables, using the test design on the table to spark discussion of the characteristics and impact of the proposed transformation; final presentation of the results in a plenary session; final synthesis (oral, perhaps with visual aids) of the aims proposed and the issues emerging, in order to figure out the planning recommendations.

The comparative matrix as a tool for selecting test designs

To select the most representative test designs for the workshop, a comparative matrix has been developed as a key tool. This is effective for two reasons: first it helps to break down the complexity of each design into essential, readable elements, and secondly it helps to directly and rapidly compare different proposals both as a whole and as single components. A first step is to identify the thematic layers through which the design needs to be read, mainly infrastructural, environmental and settlement systems. Simple graphics are preferred, to help non-experts to be involved in the reading process. The matrix is therefore created by placing the individual thematic layers along the Y-axis and

figure 3: Visual designer's drawings about the key results of co-design workshop

the different projects along the X-axis, which provides a three-way reading leading to different considerations and evaluations. Above all:

- in the grid, the reading of a single box permits an immediate assessment of the consistency or of the qualitative relevance of the project on the basis of a specific design element;
- reading horizontally permits a first evaluation of a specific topic used in the various projects;
- reading vertically helps in gaining an effective understanding of the overall project by breaking down its constituent elements.

Finally, the matrix should be considered as a frameworking tool that must necessarily be declined in the various regulatory, administrative and local realities in which the project is located. This involves a careful analysis of which components have to be selected before proceeding with the definition and construction of the matrix. In this way the matrix provides a comparative tool for different design proposals, helping to select the three alternative proposals used in the test-design workshop.

In the final roundtable, the shared outcomes of the discussion - common to the different working tables - are summarized in a report that will help in drafting the final summary diagram (key map), as well as in putting together the planning recommendations.

Planning recommendations

ELENA SOLERO, GIORGIO VITILLO, PAOLO GALUZZI

figure 1: The stakeholders attending the workshop in L'Argentière-la Bessée

The final outcome of the test-design process is a set of planning recommendations, expressed through the definition of principles to adhere to and performances to be achieved/guaranteed in the subsequent planning steps. Such a procedural-design methodology (from "project to process") can be applied across the Alpine territory despite the locally different geographies, economies and societies. The results should recognize the plural condition of mountain identity, as well as the uncertainty of future developments. This condition requires new working approaches, not conventional projects. The purpose is to set up favourable conditions able to meet and integrate the necessary changes, considering the inevitably long-term perspective of spatial transformations.

The planning recommendations are the result of a collaborative model oriented towards building an idea of the future necessary to coordinate our own actions: real opportunities for the future, open systems to eventualities, or reading keys bearing contradictory perspectives and several points of view, in order to offer a background or a pathway to local communities in which they can recognize themselves.

A well-conducted workshop generates several different development paths (or enabling tools), among which the recurring ones are 1) start-up/temporary activation, 2) intensive development ("back-to-city"), 3) extensive development ("back-to-nature" or productive waiting).

1. Start-up/temporary activation

   While waiting for a definitive transformation of the abandoned or underused industrial area, the need/opportunity to activate parts of the area appears as a priority intervention capable of triggering transformations and the renewal process. This development path is based on the implementations of the required actions (such as ecological networks or public open space) to set off the area.

2. Intensive development ("back to city")

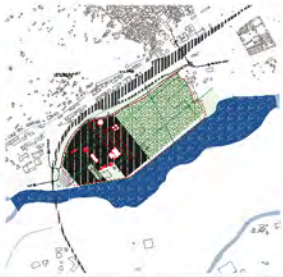
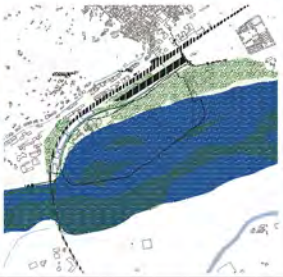
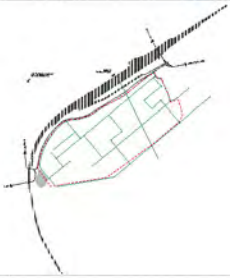
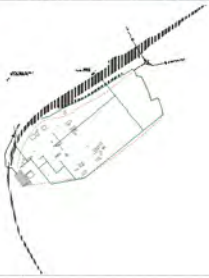
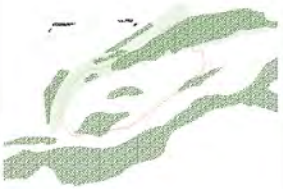
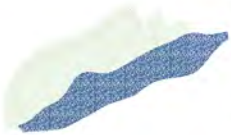
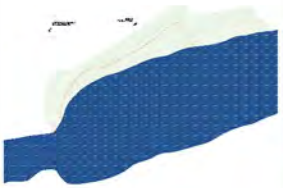
   The "back-to-city" development path provides for the re-use of existing buildings and/or the construction of new buildings, organizing a framework of paths and public spaces that has to interact coherently with the existing one.

3. Extensive development ("back to nature" or productive waiting)

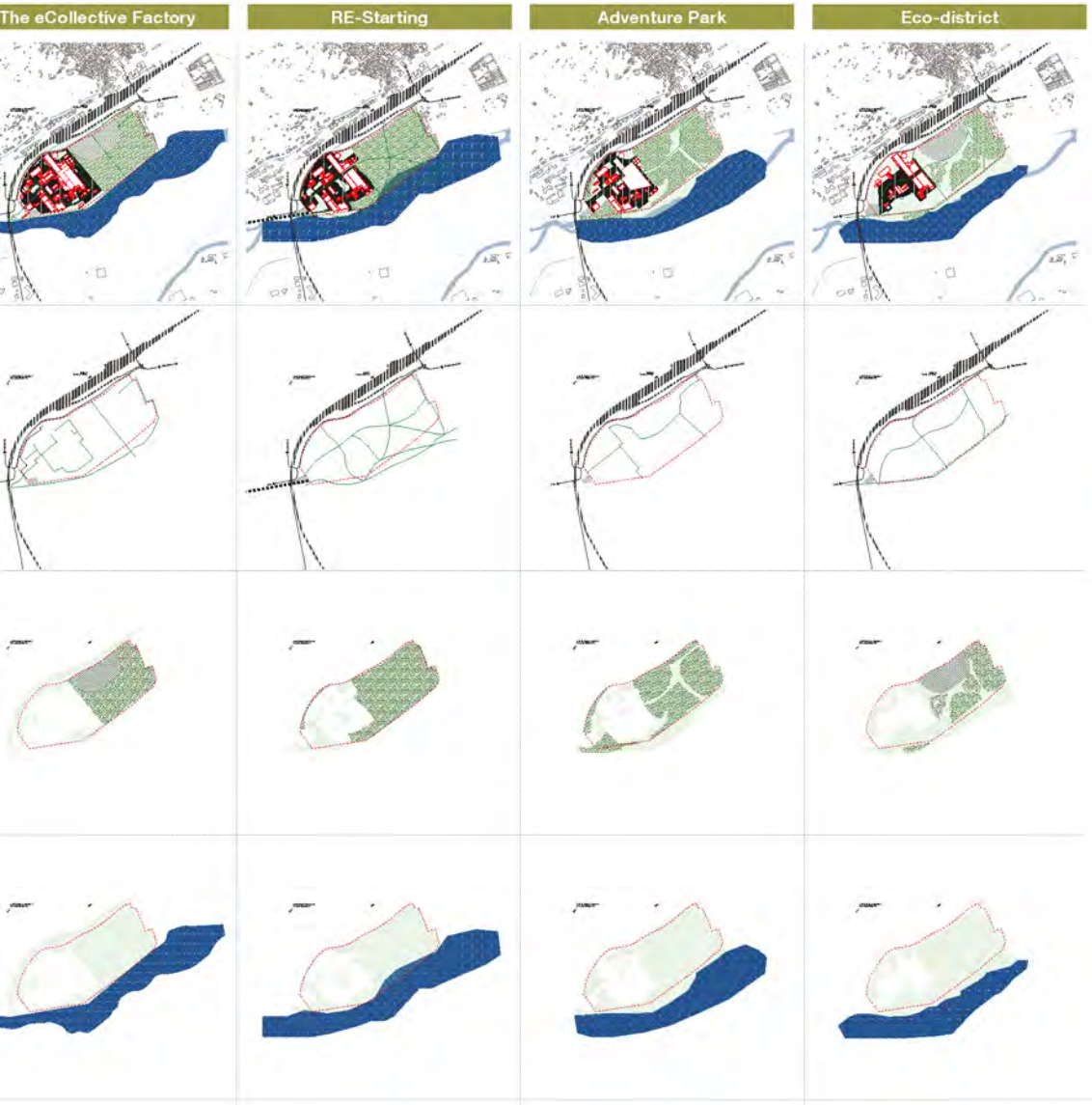
   The "back-to-nature" scenario provides for a prevailing renewal of the environment for the area including the removal of existing buildings/infrastructures. The later development involves three steps: 1) sparsely vegetated landscape with spontaneous succession, 2) grassland-dominated landscape, 3) forest-dominated landscape.

Shared between the three development paths, and preliminary to their future implementation, there is a key map on which the commonly agreed issues from the workshop are represented and displayed. These may include the network of public spaces, the environmental system or relevant buildings and structures to be maintained. The key map is a valuable tool in the hands of the community, a starting point for the future of the site.

TUM

	REbinding Borgo	Italframmenti	Italcementi Campus	Level up	reMOVE.it
					
MOBILITY					
FOREST AREA					
NATURAL SPACES					

POLIMI



Mobility

- railway
- parking
- road access
- pedestrian path

Environment and Open Spaces

- squares/social spaces
- urban forest
- natural habitats
- public space
- archeological park

Settlement

- existing
- added
- reused/"ruins"

TOTAL BUILT-UP AREA

NEW BUILDINGS

REUSED BUILDINGS

OPEN SPACES/SQUARES

Students

TUM

Group01_Rebinding Borgo
Fabian Konopka, Jan Rościszewski, Carling Sioui

Group02_Italframmenti
Alexandra Grama, Sabrina Trampen

Group03_Italcementi Campus
Daniela Jell, Pasha Vredenbregt

Group04_Level up
Larissa Böhrkircher, Josef Östblom, Lotta Steger

Group05_reMOVE.it
Sophie Allendorf, Alina Kersten

POLIMI

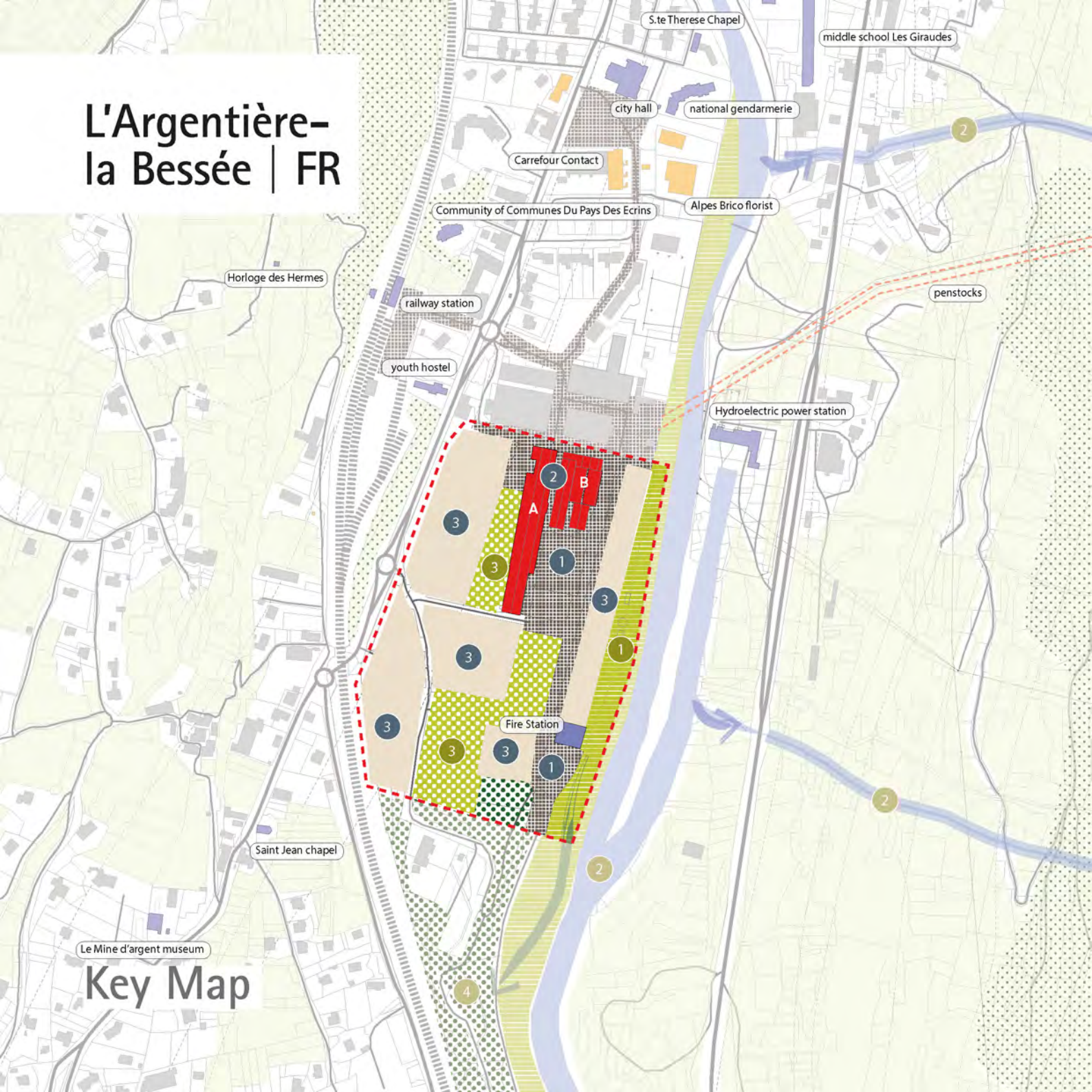
Group01_The eCollective Factory
Davut Ayhan, Veli Eren Erzincan, Renana Zohar

Group02_RE-Starting
Letizia Cavalli, Hossein Faraji, Geronimo Felici Fioravanti, Siavash Rashidi

Group03_Adventure park
Sara Cavagna, Silvia Commissari, Michele Sinisi, Nicolò Tonin

Group04_The eCollective Factory
Shahriar Shad Ariaee, Federico Brancoli de Monteforte, Maria Matteo Chirico, Tommaso Favaretto

L'Argentière-la Bessée | FR



Key Map

Ecological Network

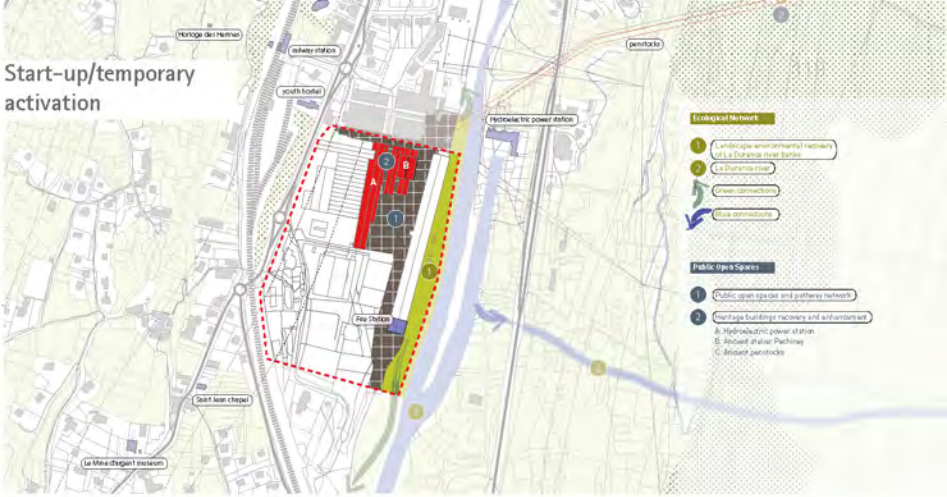
1. Landscape-environmental recovery of La Durance river banks
2. La Durance river
3. Vegetation cover increasing
4. Existing structures preserving
5. Green connections
6. Blue connections

Public Open Spaces

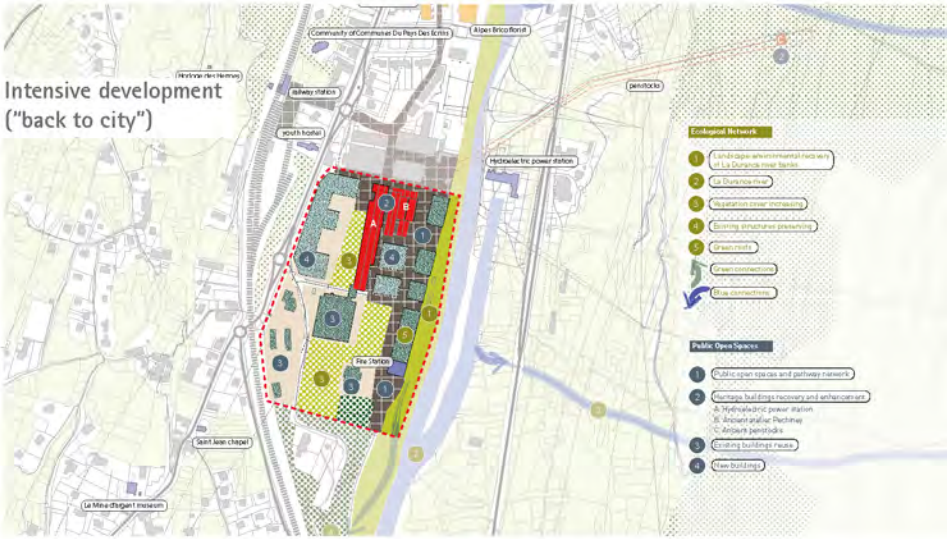
1. Public open spaces and pathway network
2. Heritage buildings recovery and enhancement
   - A. Hydroelectric power station
   - B. Ancient atelier Pechiney
   - C. Ancient penstocks
3. Redeveloping building areas

scale 1:5.000 approx.

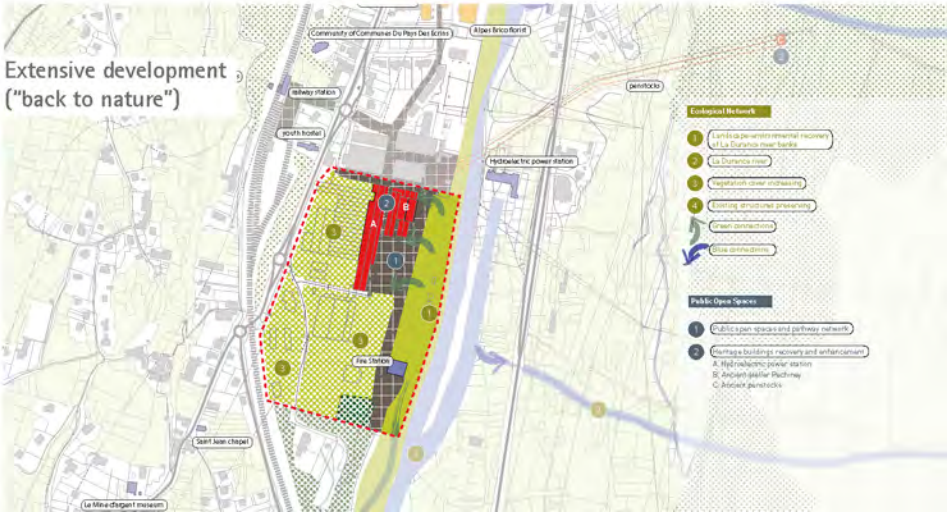
Start-up/temporary activation



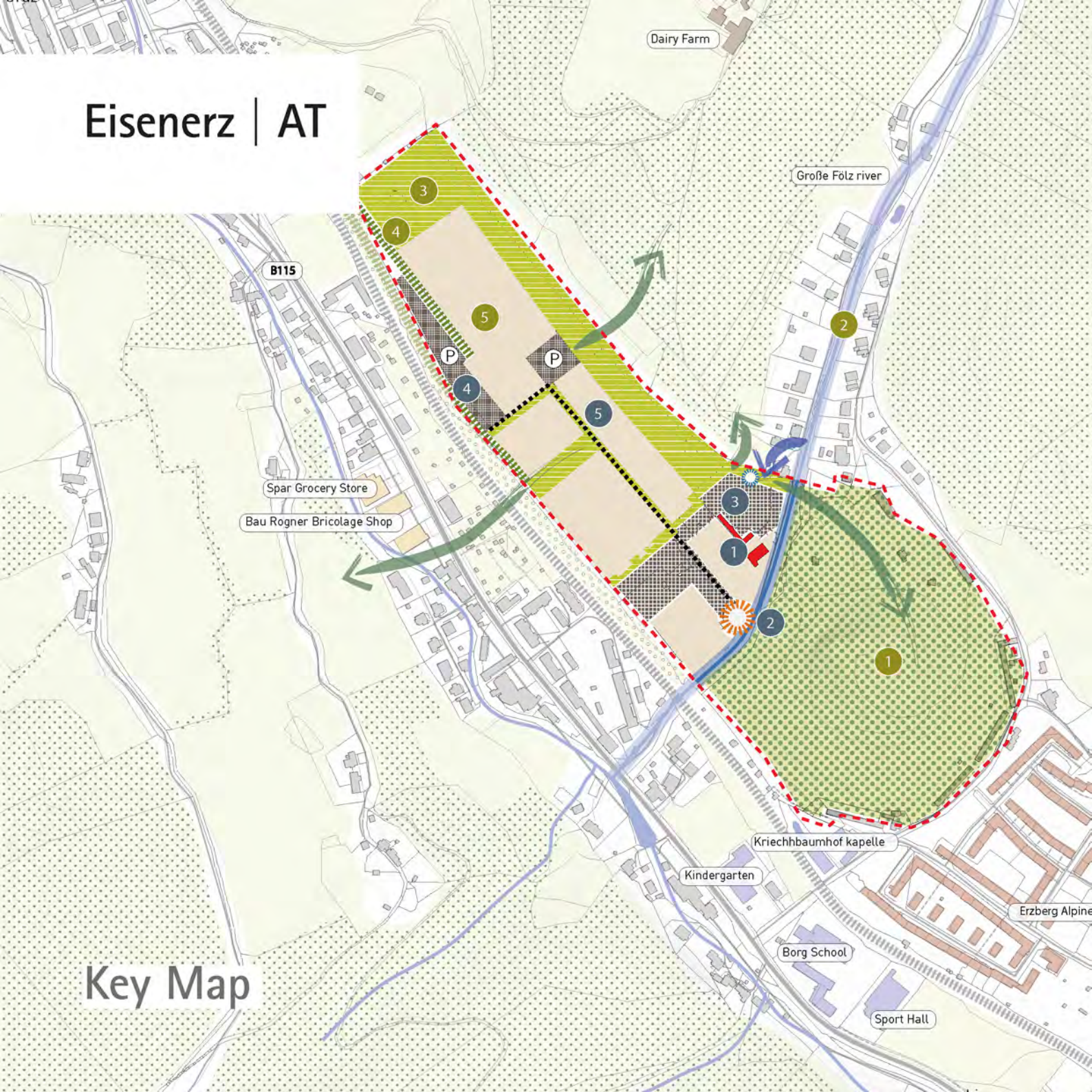
Intensive development ("back to city")



Extensive development ("back to nature")



Eisenerz | AT



Key Map

Ecological Network

1. Minimal planting and seeding
2. Große Fölz restoration
3. Enhancement of woodlands
4. Green railways tracks

Green connections

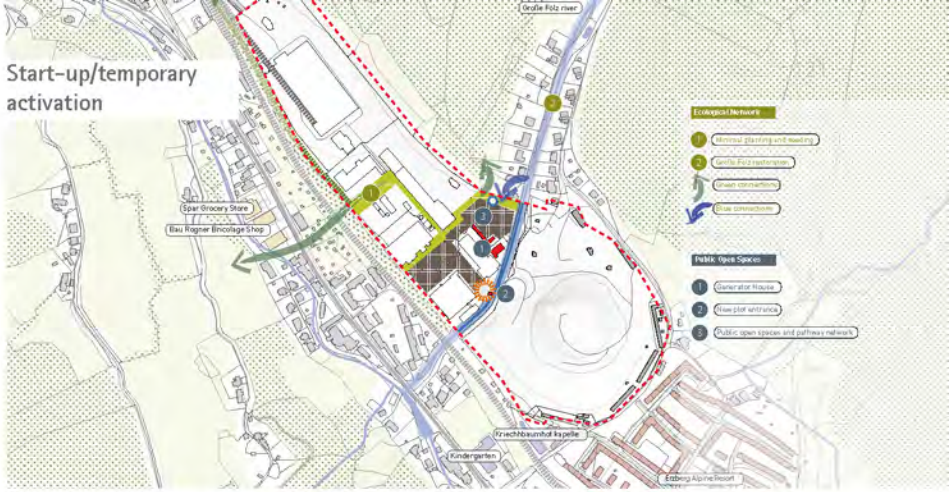
Blue connections

Public Open Spaces

1. Existing building reuse
2. New plot entrance
3. Public open spaces and pathway network
4. Tree-lined parking

scale 1:5.000 approx.

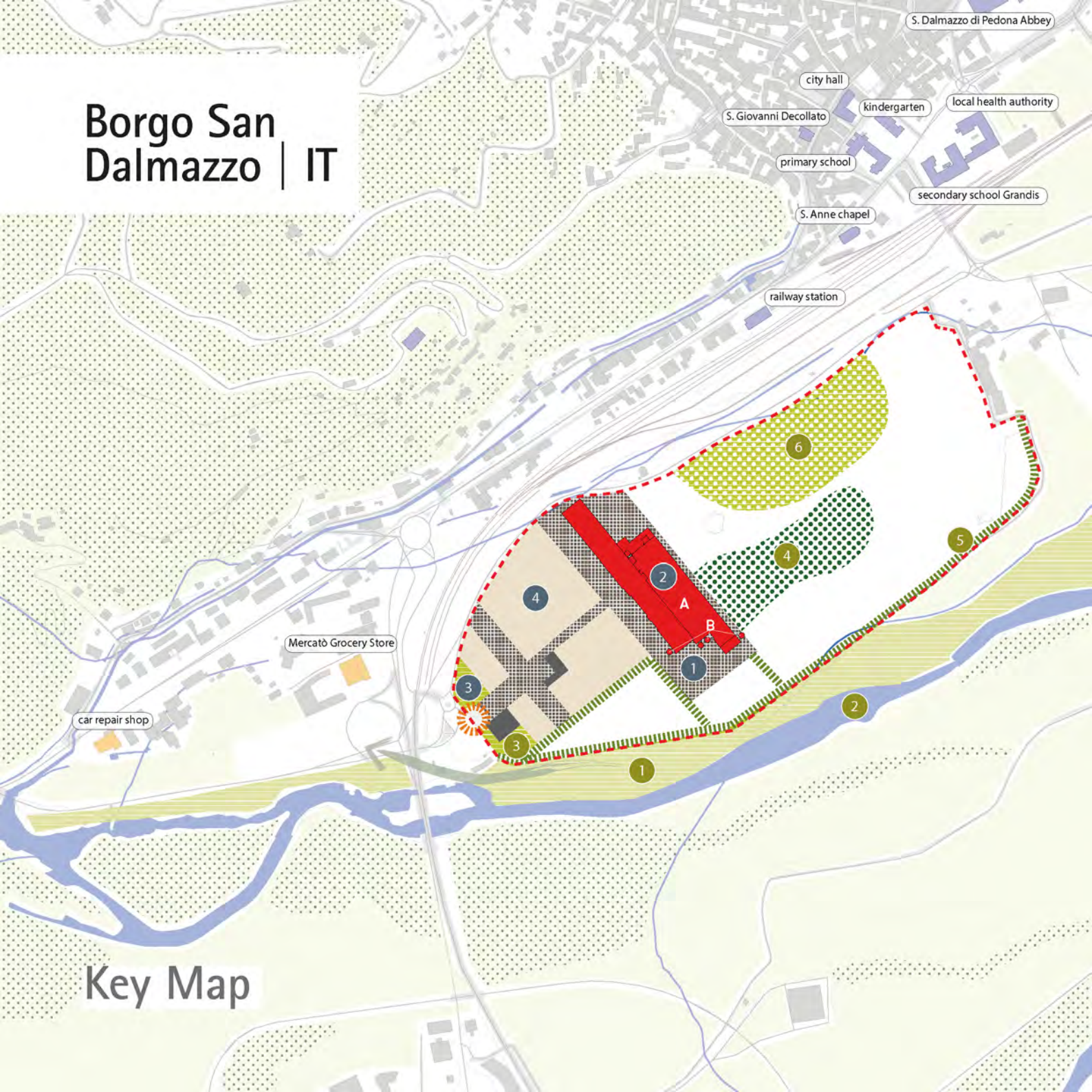
Start-up/temporary activation



Intensive development ("back to city")

Extensive development ("back to nature")

Borgo San Dalmazzo | IT



Key Map

Ecological Network

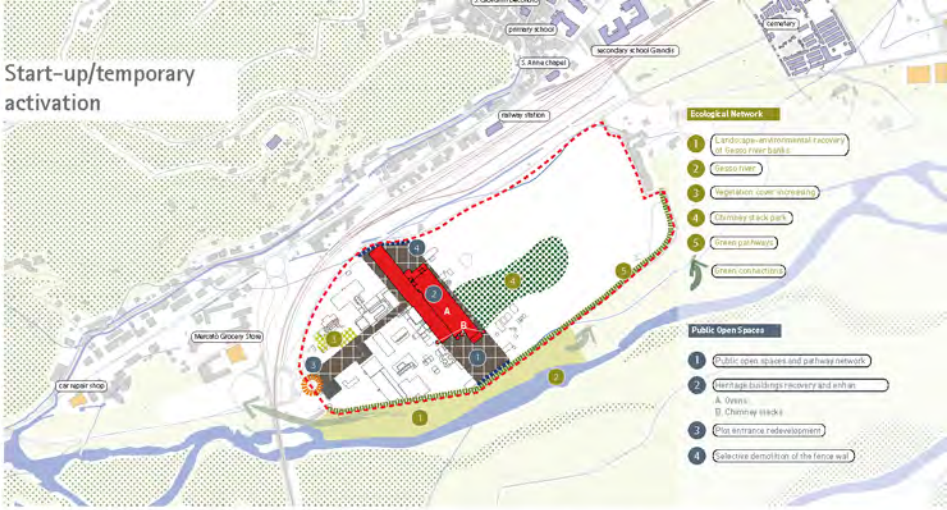
1. Landscape-environmental recovery of Gesso river banks
2. Gesso river
3. Vegetation cover increasing
4. Chimney stack park
5. Green pathways
6. Archeological park

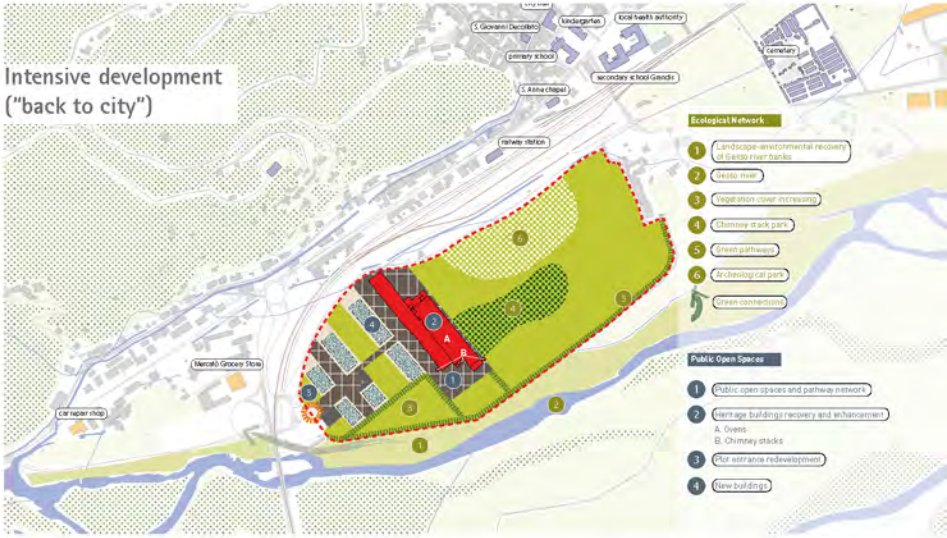
Green connections

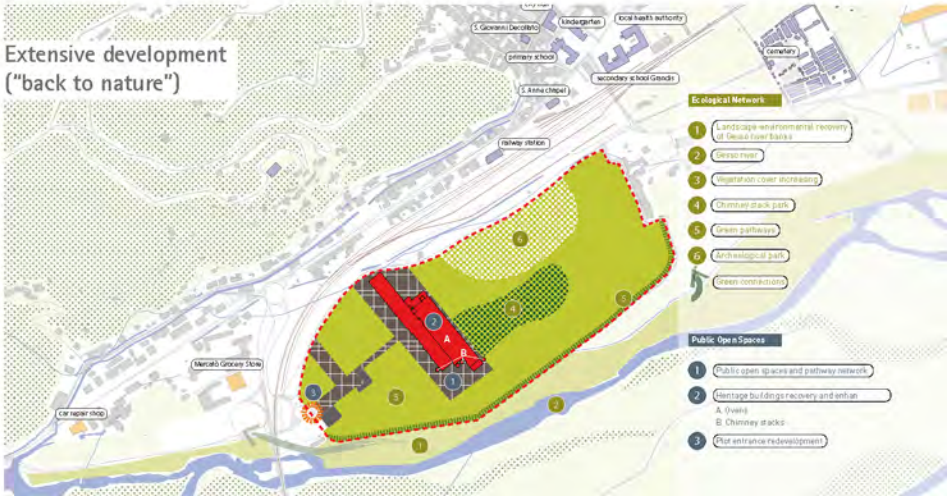
Public Open Spaces

1. Public open spaces and pathway network
2. Heritage buildings recovery and enhancement
   - A. Ovens
   - B. Chimney stacks
3. Plot entrance redevelopment
4. Redeveloping building areas

scale 1:5.000 approx.







Conclusions : :

127 Preparing

128 Analysing and Programming

129 Test Designing

130 Evaluating and Synthesising

131 Implementing

Conclusions and recommendations

MARCELLO MODICA, UDO WEILACHER

Transforming an existing landscape, no matter if it has been exploited by humans or not, is a complex operation. All landscapes, in particular industrial landscapes, are highly complex systems, often characterized by dynamic human/non-human interaction, non-linear and unpredictable developments, permanent change and the emergence of new order or structure depending on industrial activity, or its absence. The following conclusions and recommendations for the management of industrial landscape transformation in the Alpine context, derived from the overall trAILs experience, are based on five fundamental principles and assumptions.

1. **Industrial landscapes are considered and valued as cultural landscapes.** They are formed by people over time, linked to their cultural identity and the represent the specific qualities of a local community or whole regions.

2. **The strengths and specificities of the Alpine landscape** require very special attention and are the basis for a targeted landscape approach to inner-Alpine transformation tasks.

3. **The necessity for change needs to be obvious** and well documented before starting a transformation process. No problem – no project.

4. **The trAILs approach is always site-related, design-based, communication-based and interdisciplinary. Site-related,** because every site is different. A successful project has to stay permanently in touch with the site. **Design-based,** because future-oriented site planning needs a creative and science-based approach. This has to be clearly communicated within a holistic vision, presented in plan graphics, perspectives and models. **Communication-based,** because open communication between all stakeholders is key to mutual understanding and successful cooperation. **Interdisciplinary,** because complex environmental problems cannot be solved separately by individual experts each with their own specialism.

5. **A positive and constructive attitude towards the site transformation shall drive the whole process.** Even if an industrial site has lost its primary productive purpose it might still have an important function for the social life of a community, the ecological value of a landscape or the economic strength of a region.

The following recommendations deal with the organization of a transformation process and are related to the first four phases of a project:

- the preparation phase before starting the transformation process, focused on organizational questions and communication
- the analysis and programme phase, focused on the analysis of the site and its social, economic and ecological context
- the test-design phase, concentrated on the open and direct communication between all stakeholders to generate common ground and to establish a vision for the future shared by all project partners.
- the evaluation and synthesis phase, focused on the generation of binding development goals, legal stipulations and concrete first development steps.

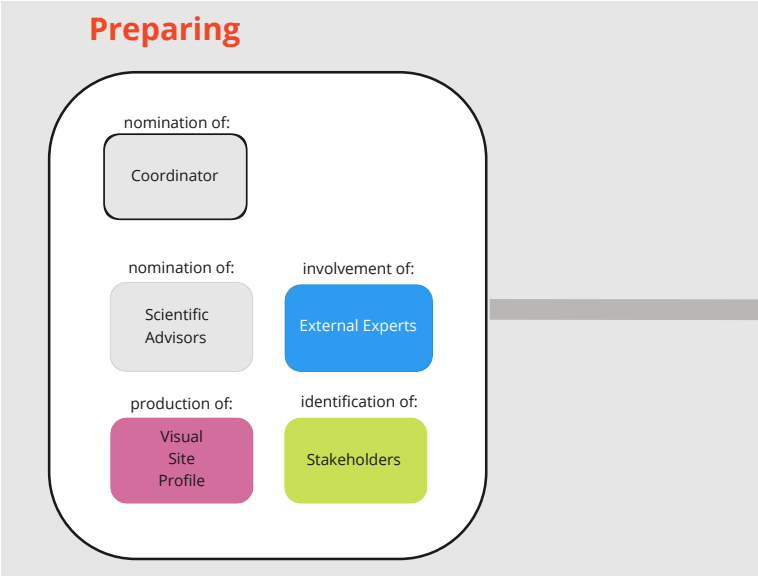
The fifth phase, dealing with implementation, is not part of the trAILs project, but recommendations are included here as well.

Please note the colour indications:

- Communication aspects
- Site aspects
- Design aspects
- Interdisciplinary aspects

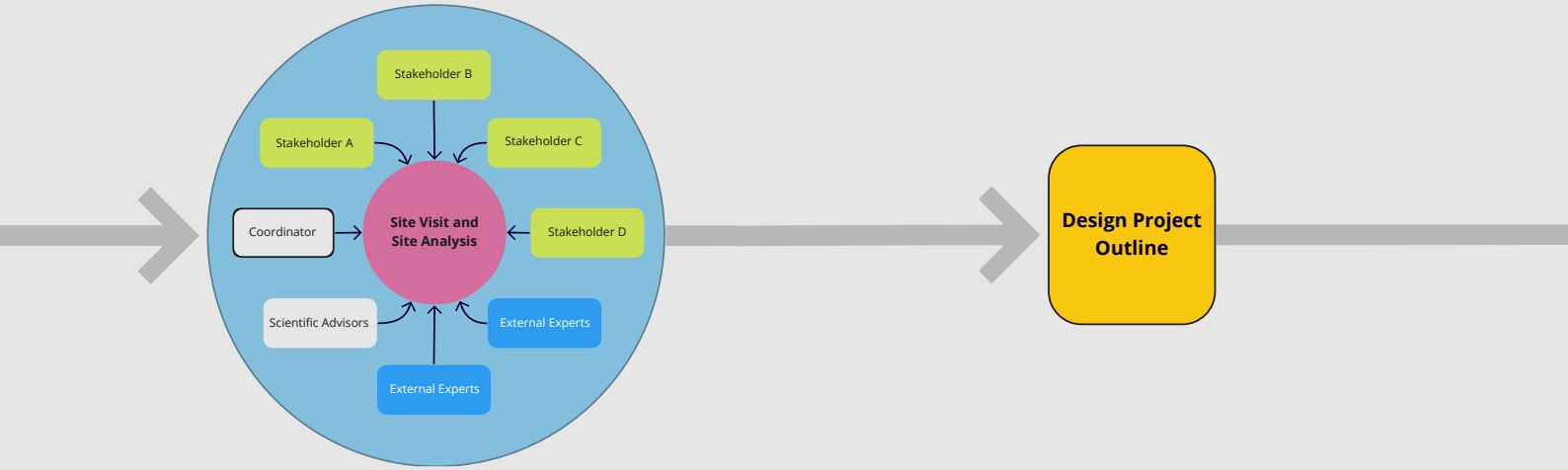
Preparing

- **Nominate a coordinator.** Experience in communication, planning and design issues preferred. Coordinating all steps centrally ensures a focused project approach.
- **Develop a clear communication strategy for the whole process.** Incorporate an identification of target groups and methods of communication with the public.
- **Join forces with the region and neighbouring communities.** The influence of industrial brownfield sites often reaches beyond the local area.
- **Seek scientific advice.** Solid communication, planning and design competences (landscape and/or urban planning) are required to ensure a clear methodological approach to the transformation process based on interdisciplinary exchange.
- **Involve appropriate interdisciplinary expertise.** Ensure competences for brownfield transformation with respect to spatial planning, landscape architecture, architecture, environmental and social and economic sciences, policy analysis, cultural heritage etc.
- **Clarify the site ownership**
- **Document the planning background and framework.** Good knowledge about planning history and background, the administrational framework related to the site and its context is needed.
- **Identify and connect the stakeholders.** Establish a network of stakeholders. Evaluate their experience, competencies and relevance with regard to the site transformation. Early involvement of all key players will ensure the minimization of later conflicts of interest.
- **Inform all participants about the whole process.** Clearly inform all project partners about the aim of the project, the methodology, the objectives etc.. No room for hidden agendas.



- **Visual presentation of the site profile.** Early visual documentation of the site (photo, video, drawing, etc.) is key to a successful design-based approach.
- **Get on the site early!** Get direct experience and impressions on site to gain site-specific knowledge.
- **Never look at the site isolated from its context.** Besides the social and economic context, the landscape and environmental context is of importance due to specific natural conditions in the Alps.

Analysing and Programming

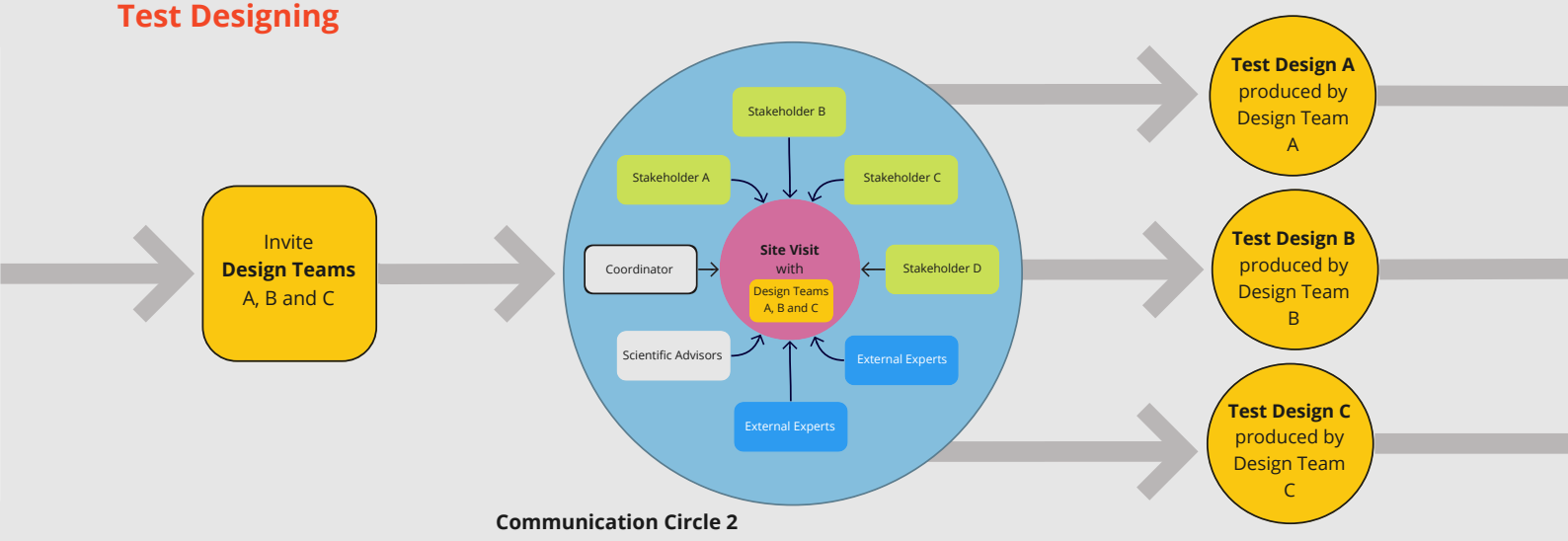


Communication Circle 1

Analysing and Programming (Communication Circle 1)

- **Involve a moderation team early.** Moderation needs to have expertise in interdisciplinary, communication-based and design-based planning strategies.
- **Inform all participants clearly about the test-design process.** Test design is a method focussed not on creating a winning project but on generating an open, cross-disciplinary discussion with all stakeholders. The aim is to identify the most important key issues for future site transformation.
- **Collect, condense and compile both on-site and off-site information.** Site-specific solutions should be based on profound knowledge of the site, gathered externally and by first-hand experience on site.
- **Meet with all participants** (experts+stakeholders) on site. Successful site-related planning needs direct contact with the location to collect individual impressions.
- **Include all stakeholders –not only experts– in the analysis process.** Everybody should contribute to the site analysis to ensure a comprehensive understanding of the area.
- **Communicate analysis goals clearly.** Productive open discussion between all project participants is based on a clear understanding of gathered information. No specialised technical language.
- **Create a clear design project outline and allow visionary solutions.** A profitable and precise discussion about alternative transformation strategies depends on a precisely formulated task for the test-design projects, allowing free space for visions.

Test Designing

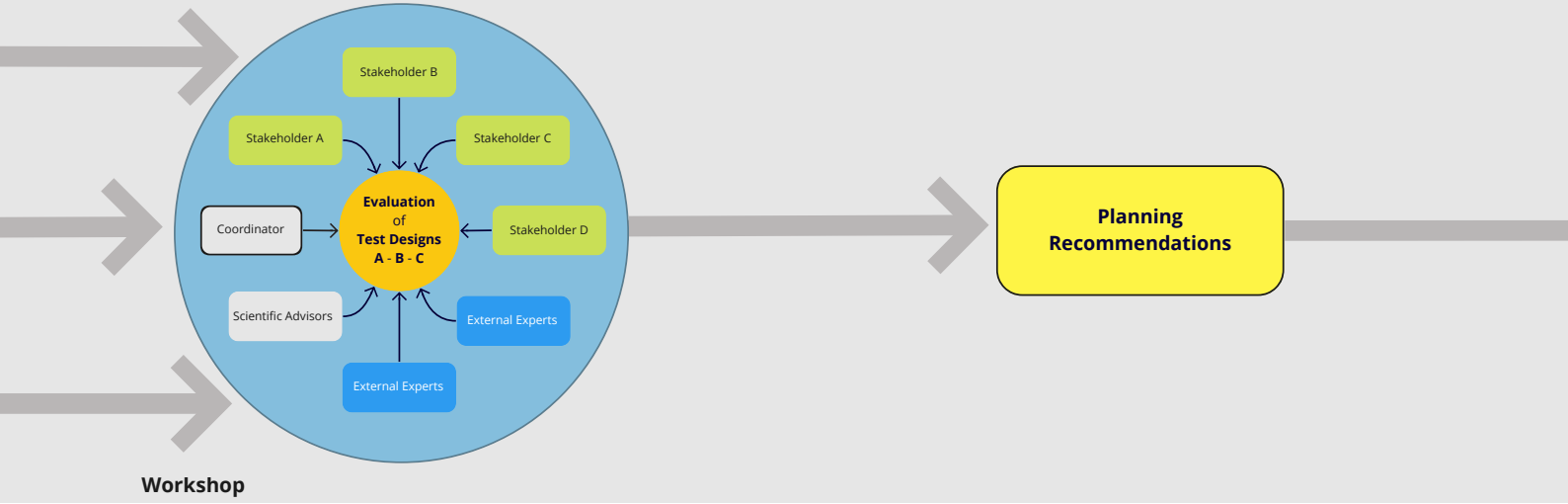


Communication Circle 2

Test Designing (Communication Circle 2)

- **Commission at least 3 independent design teams.** No competition and no winner wanted! Coordinator selects the design teams (offices), based on their professional expertise. All teams get the same compensation for their work.
- **Organize a site visit with all partners and design teams.** All participants should visit the site together with the design teams and discuss all open questions.
- **Allow for enough design time.** Detailed design takes time. Calculate at least 3 months' working time. If possible, arrange additional feedback-circles where all design teams can present and discuss their progress.
- **Have detailed test designs produced.** The test designs shall be as precise as possible (scale 1:1000 – 1:200) and deliver differentiated ideas to provoke enlightening discussions among all stakeholders. Plans, models, perspective drawings etc. need to communicate the underlying design ideas as transparently as possible.
- **Communicate the test design results to the public.** Gather early local feedback by communicating the test design alternatives to the public.

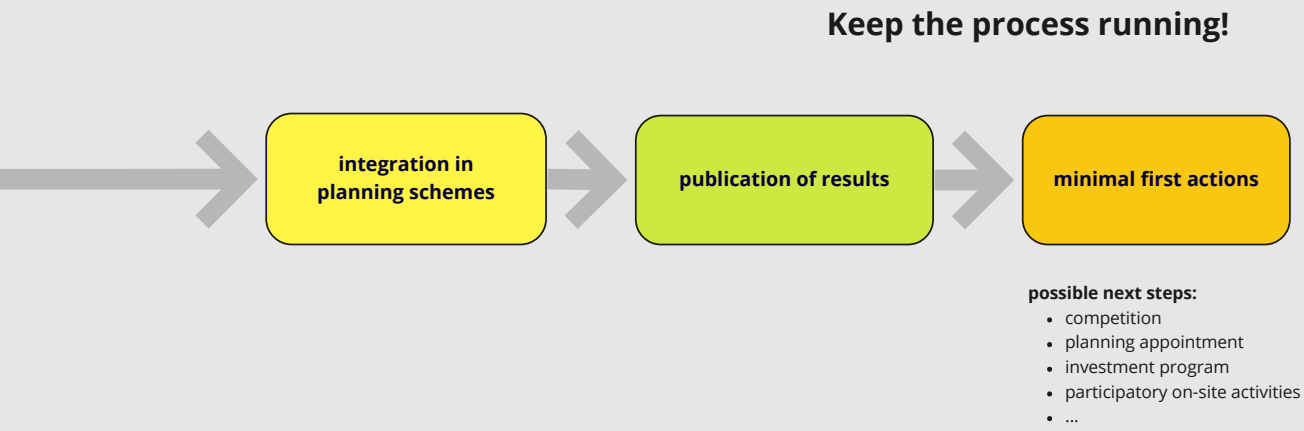
Evaluating and Synthesising



Evaluating and Synthesising (Workshop)

- **Discuss the test design project interdisciplinary.** Test design is an intensive communication and learning process to generate mutual understanding. Discuss the test design projects in interdisciplinary plenary sessions.
- **Give the design teams an opportunity to present and explain their work.**
- **Organize the workshop in such a way that all the stakeholders and experts can actively contribute.** Learning from each other and creating mutual trust is key to success.
- **Ensure sufficient time for the workshop.** At least one full day should be arranged for the workshop. Allow plenty of discussion time and enough breaks for informal communication.
- **Structure the workshop well.** Enable various levels of interaction, from focus groups to roundtables to plenary sessions, and keep the communication going at all cost.
- **Set the workshop near the site.** If difficult questions about the location should arise in the discussion, an immediate site inspection is helpful.
- **Make sure, the moderation team is fully aware of the site situation and related challenges.**
- **Generate a clear and mutually agreed result at the end.** The test-design process seeks to generate common agreements on most important key issues for future site development. Make sure all discussion partners feel committed to the findings and planning recommendations at the end of the workshop.

Implementing



Implementing

- Planning recommendations shall be integrated in local and regional planning schemes.
- Publish the process and result of the project in newspapers, videos, exhibitions, etc.. The success of transformation processes also depends on a broad support by the public..
- Formulate minimal actions to be implemented immediately. Complex transformation projects normally take several years to be fully implemented. Start very early with minimal actions immediately after the test-design process to signalize the beginning of change.
- Keep the process running!

Possible next steps:

- Development and publication of a competition announcement, based on the planning recommendations generated in the test-design process.
- Direct appointment of a planning office with a clear requirement to strictly respect the planning recommendations generated in the test-design process.
- Generation of investment programmes and/or applications for funding, based on the planning recommendations generated in the test-design process.
- Participatory on-site activities to generate temporary first installations signalling change on the brownfield site.
- ...

Annex 1 : :

Test designs

136 Münichtal, Eisenerz, Austria

138 Italcementi, Borgo San Dalmazzo, Italy

140 AFP-Péchiney, L'Argentière-la Bessée, France

142 BPT factory, Tržič, Slovenia

Test design examples

Test designs are a key element of the trAILs methodology, because discussions about a possible future of a derelict site can be conducted a lot more precisely and seriously with detailed visions on the table. Design projects, based on solid assessment results and consisting of illustrative plans and visual representations, constitute the main discussion base for the local workshops with stakeholders and experts. They fuel the debate about the key elements for future planning recommendations, provided that they have been worked out meticulously and at the same time with vision on the basis of extensive analyses.

For each of the four trAILs workshops, at least three different design alternatives per pilot site were produced by partner universities with design and planning competences, through the involvement of young landscape architects, regional and urban planners. All design teams were provided with the same input materials and joined a site visit to get known with the site structure and challenges. On scales ranging from 1:10,000 to 1:1000 and 1:200, the teams then worked individually but in open interdisciplinary exchange and cooperation to develop their concepts and proposals for the site. The design teams worked hard and dedicated to communicate their ideas by means of complex plans, visual representations, diagrams and explanatory reports. To provide an insight into the design quality and level of detail, a small selection of the test-designs used in the four trAILs workshops is presented over the following pages.

pilot site Austria

pilot site Italy

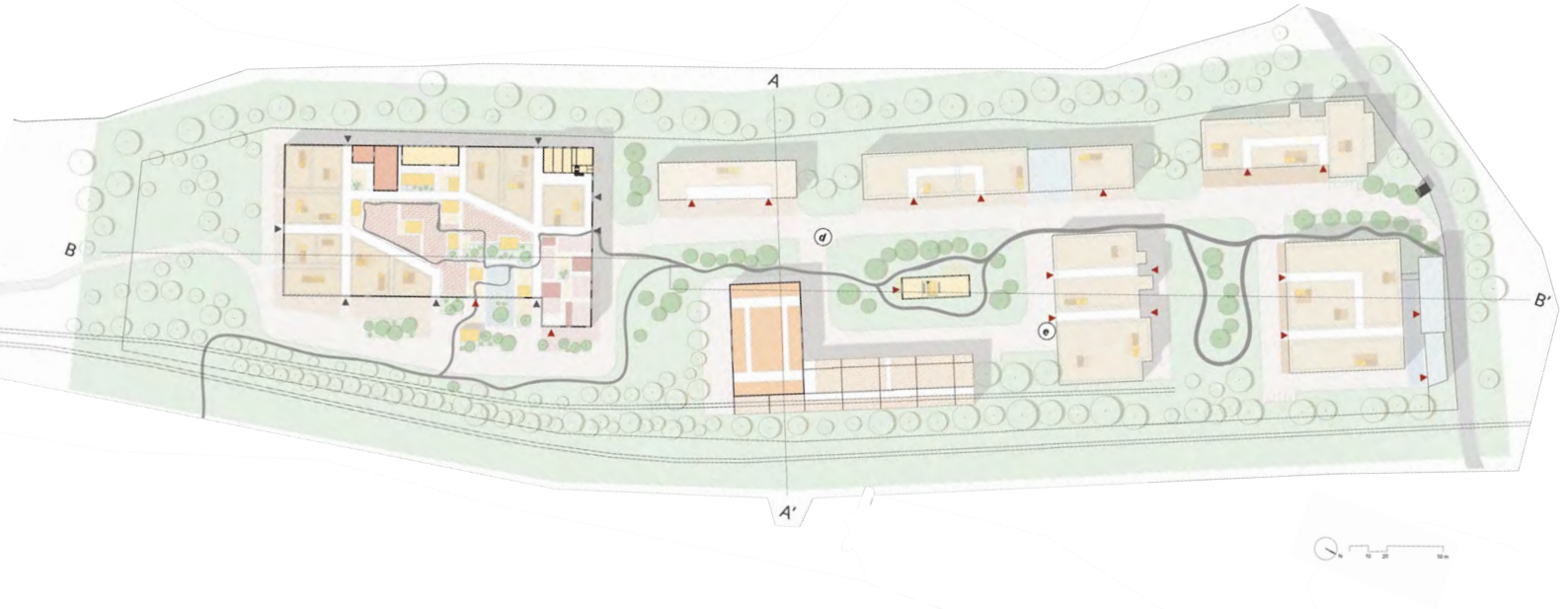
pilot site France

pilot site Slovenia

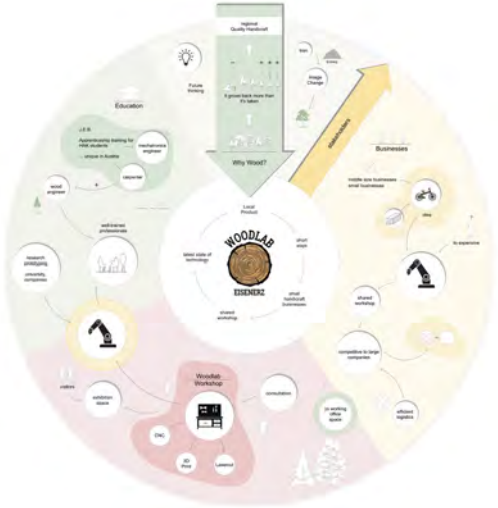
Münichtal, Eisenerz, Austria

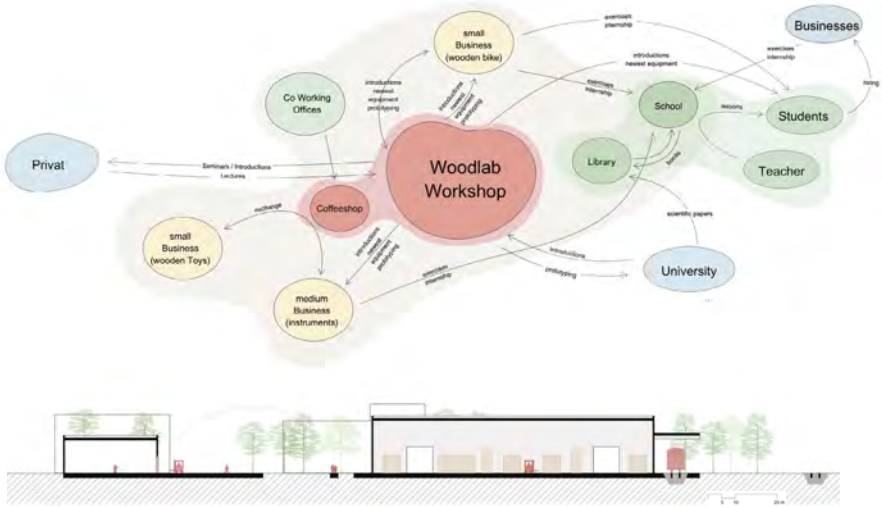
PROJECT TITLE: WOODLAB EISENERZ

SARAH GROSS, SARAH RAIGER, MAX SCHEIDL (TUW)



The "Woodlab Eisenerz" project redesigns the industrial site, in the north of Eisenerz, into a modern and friendly working environment. The main task is to solve some of the key problems of population decline in the area around Eisenerz. The biggest problems are a lack of jobs for young people, poor educational opportunities for adults and a shortage of skilled workers in the region. In addition, Eisenerz still has the image of an industrial city. This project will bring stability to Eisenerz and its residents. Woodlab is a network, in which businesses, universities, schools and research institutes having to do with wood processing come together. In this network, professionals can be contacted, advanced courses are offered and the members have modern equipment for wood processing at their disposal. Through this network, exchange of knowledge is more easily accessible and every member can profit from it.. The redesigned site is used by small to medium-sized businesses from the wood sector. The heart of the project, the Woodlab Workshop, is located in the former Alumelt hall. The already existing cooperation between "HAK" (high school for business administration) and "JEB" (centre for youth and adult education) will be further expanded, which means that more apprenticeships in the wood sector will be offered. The image change will be created by the fact that the mainly used material is the regional resource of wood. In addition, only electric vehicles will be used to distribute the goods on the site, and this will be as autonomous as possible. The supply and delivery will be done collectively, saving costs and time. The logistics and transportation on site are environmentally friendly and the buildings are designed to be sustainable for the future. In addition to the Woodlab Workshop with associated storage areas and offices, the project also includes exhibition areas, a restaurant and a visitor's trail.

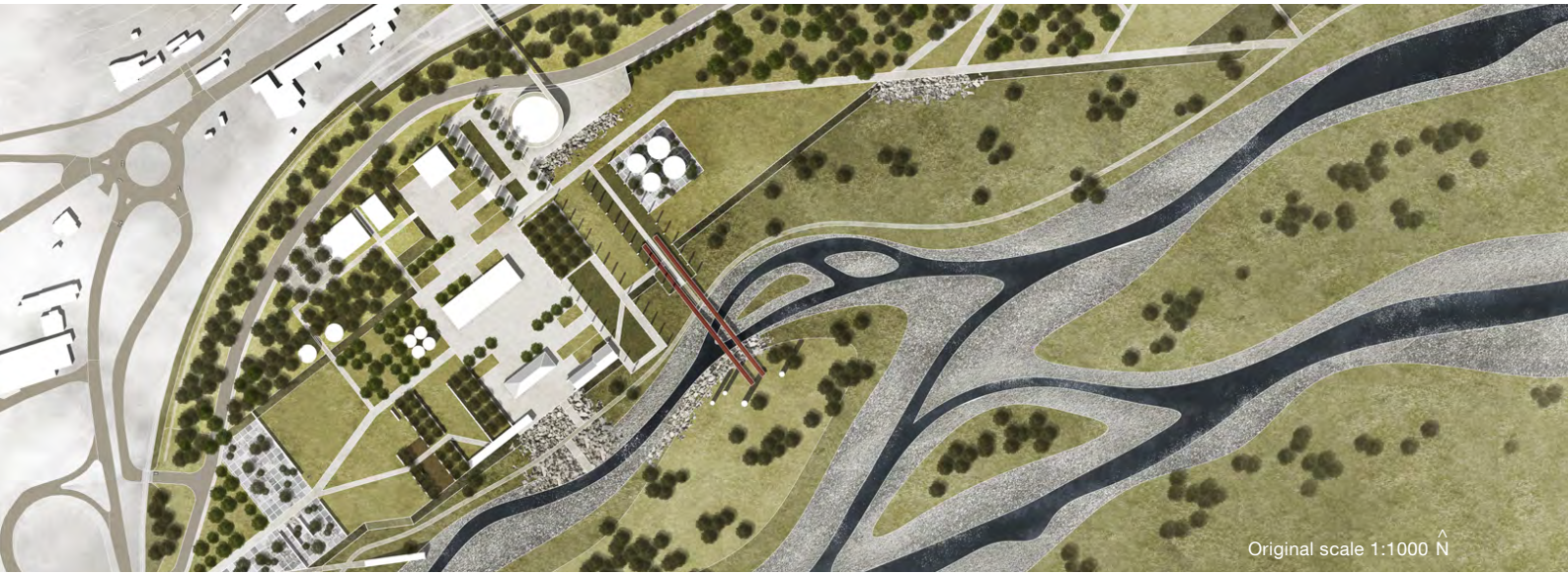

Education
Why Wood?
Businesses
WOODLAB
EISENERZ
Woodlab Workshop


Privat
Co Working Offices
small Business (wooden bike)
Businesses
School
Students
Library
Teacher
Woodlab Workshop
Coffeeshop
small Business (wooden Toys)
medium Business (instruments)
University

Italcementi, Borgo San Dalmazzo, Italy

PROJECT TITLE: LEVEL UP

LARISSA BÖHRKIRCHER, JOSEF ÖSTBLOM, LOTTA STEGER (TUM)



The Italcementi Spa cement plant in Borgo San Dalmazzo is located directly in the floodplain of the river Gesso, was built in 1947 and has not been in full operation since 2009. Very likely it will be closed down completely in the coming years. It is important to be prepared for that time, for the afterlife of the industrial plant with its iconic high chimneys rising above the woodland along the Gesso.

The design project, entitled 'Level Up', targets social, economic and ecological aspects. It reduces the size of the industrial terrain, gives more room to the river and offers a designed public park and community centre to the people of Borgo San Dalmazzo. The slope towards the river is landscaped into terraces to allow for better use of the site and at the same time to tackle the high risk of flooding at the site and in nearby areas. Subdividing the intervention into three partially floodable levels, the design reconnects the river Gesso to the town both physically and mentally. By keeping and reusing elements of the existing factory, the identity of Italcementi and therefore its history is being kept, while the site takes on new forms, offering a variety of possible uses and space for further future development. A key aspect of the project is to overcome barriers and to create new connections, be they between the two currently separated towns of Borgo San Dalmazzo and Roccavione or between the former industrial site and the pilgrimage church of Monserrato, which is of great importance to the people of the villages.

Original scale 1:200

AFP-Péchiney, L'Argentière-la Bessée, France

PROJECT TITLE: THE CURRENT

INGA BORGE, TAN AU CA NGUYEN, FAN WEN (TUM)

Since the closure of the Péchiney aluminium plant in L'Argentière-la Bessée in 1988, the development of the former brownfield site was characterized by a rather random settlement of small to medium commercial actors. A strategy for future development of the area next to the Alpine river Durance has not been clearly formulated and major parts of the site still lie idle.

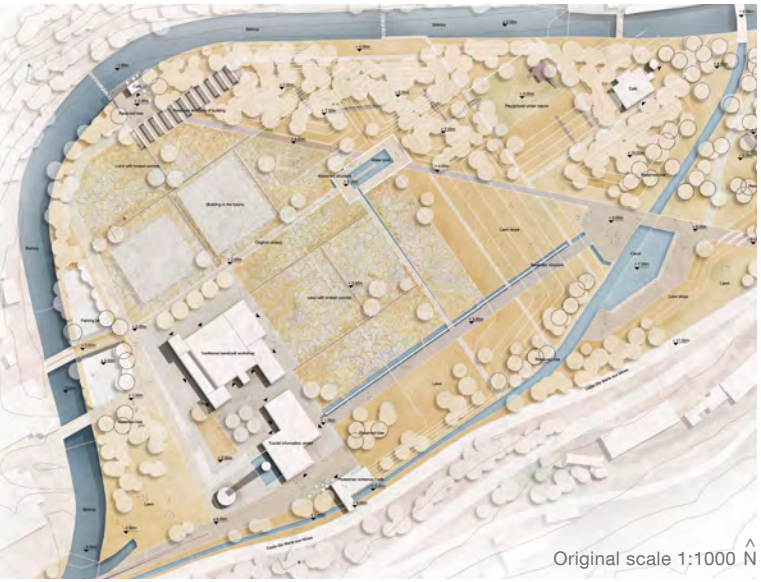
The intention of the design, entitled "The Current" is to provide a new local identity, strongly needed in L'Argentière-la Bessée. At the same time, the plan is to reinforce the centre of commerce and industry by carefully restructuring the commercial buildings on the site. The river Durance will be brought back to the image of the city and into public awareness by locating new public activity zones near the river and connecting them by a system of open spaces to the core of the city. The challenge of making the river more accessible to the community is tackled by bringing it partially into the site, slowing it down, making it safer and more attractive, while at the same time dealing creatively with flood problems happening both within the site and further down in the river system. The inhabitants hold strongly to their aluminium legacy, and therefore many historic buildings are preserved. But it is also time to look forward and give life in the city a new meaning. With a new and more futuristic landscape design for L'Argentière-la Bessée, both the inhabitants and the tourists will get many new functional opportunities, but the landscape design also takes into account the aspects of global climate change.

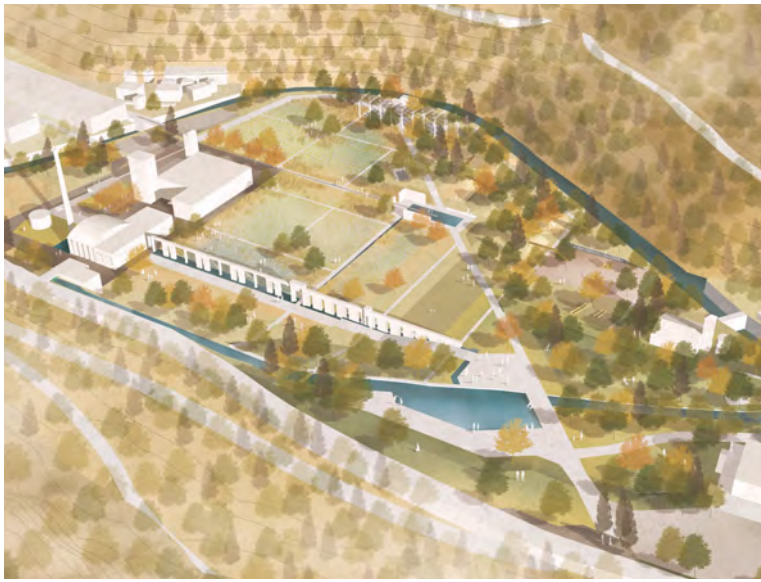
Business locals
Populus nigra
Alnus incarna
Populus nigra
+3,75
+3,50
Beachside made of sand and small gravels
Salix purpura
Fraxinus angustifolia
Alnus incarna
Betula pendula
Betula pubescens
Alnus incarna
Betula pendula
Sorbus aria
Sorbus aria
Betula pendula
Alnus incarna
Ramp
Betula pubescens
Amelanchier ovalis
Betula pendula
+2,50
Betula pubescens
Alnus incarna
Outdoor pool made of concrete water supplied by the Durance
Original scale 1:200 N

BPT factory, Tržič, Slovenia

PROJECT TITLE: PRODUCTIVE WAITING

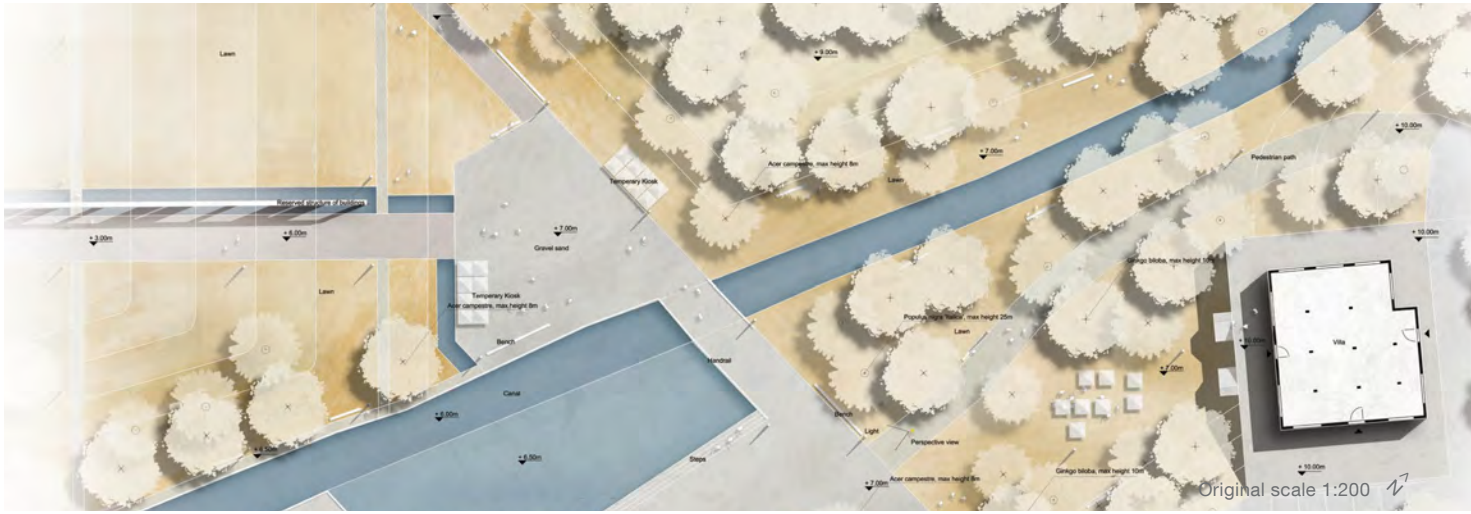
XIANG LIN, XIAOZHEN LI (TUM)





The Bombažna Predilnica in Tkalnica BPT, a spinning and weaving factory, was founded in Tržič in 1885 and shaped the development of the town for 250 years before being closed down. Now the city is facing great challenges of economic recovery and industrial transformation. After the closure of BPT, located on the banks of the Bistrica River, the area has been almost completely abandoned, leaving behind some valuable historical industrial buildings. The significant location right next to the old town and its precious industrial history has great value and potential as a key point for promoting economic revitalization and industrial transformation.

The design project "Productive Waiting" proposes a strategy for this area to be temporarily used and qualified over an undefined period of time, because it is uncertain when a new commercial development can start on the location. Building a new tourist centre could optimize the tourism structure of the whole city, and thus works as an impetus to stimulate city's economic development. On the other hand, a large number of low quality industrial buildings need to be demolished. The leftover space might serve as a development zone, allowing for future utilisation. The demolished building material can be reused for landscape construction and the plants on site can be treated with a low maintenance strategy. So, the brownfield area can serve as a public open space without consuming a lot of resources. The project aims not only at the recovery of the economy, but also at improving the quality of city life by providing the people with more outdoor open space of higher quality.


Lawn
Reserved standard of holidays
Gravel sand
Temperary Kiosk
Acer campestre, max height 8m
Bench
Canal
Handrail
Steps
Pedestrian path
Ginkgo biloba, max height 10m
Villa
Light
Perspective view
Original scale 1:200

Annex 2 : :

Learning module

trAILs learning lab

The Alps, covering a terrain of 200.000 square kilometres, are a unique cultural landscape with a long history of heavy industrial activity. Under the influence of global processes such as socioeconomic structural transformations and climate change, this mountain range is rapidly evolving. Many of the traditional heavy and manufacturing industries developed here are declining, leaving behind impressive former productive landscapes: Alpine Industrial Landscapes (AILs). The potential value of AILs is strongly connected to Alpine-wide environmental, economic and social key challenges, such as the regeneration and improvement of blue and green infrastructures, the reactivation and upgrade of regional economies and the promotion of local identity and cultural heritage.

In this trAILs (Transformation of Alpine Industrial Landscapes) online learning lab, hosted by the trAILs research group, you will discover how to strategically deal with the transformation of complex industrial brownfield sites in the Alps, based on a specific landscape approach. You will find out how to convert industrial brownfield sites into good working and living environments, using a rich multidisciplinary methodology.

What the programme covers
With a focus on specific landscape-based problem-solving methods, using multi-disciplinary and multi-scalar planning strategies such as co-creative test planning and test design, supported by GIS technology, this programme will expose you to current trends in landscape transformation combining expertise from spatial planning, socio-economic sciences, restoration ecology, landscape architecture and urban design. You will have the chance to examine issues surrounding landscape ecology, urban planning, regional planning, water management strategies and cultural landscape development, while discussing the relationship between ecological, economic and social developments in the Alps.

In addition to learning about the transformation of Alpine brownfields, you will explore the social, cultural, political, and economic forces affecting the development of inner-Alpine landscapes, and consider flexible ways of responding to them. In so doing, you will discover how research by design, for example, can be harnessed as a meaningful tool to tackle both local and regional challenges, and ultimately serve as a means of delivering a better quality of life for the local inhabitants, adapted to new challenges in this region, caused for example by global climate change and demographic change.

This programme is for you if...

- You are looking for advanced multidisciplinary planning strategies to transform industrial brownfields in the Alps by applying design methods based on a current understanding of "landscape".
- You are interested in learning about multi-scalar transformative design methods, supported by GIS in close cooperation with experts in sociology, regional planning, landscape ecology, urban planning and landscape design.
- You want validation of your knowledge in the form of a certificate from the trAILs Learning Lab, hosted by the Technical University of Munich (TUM) in cooperation with the University of Verona (UNIVR), the Polytechnic University of Milan (POLIMI), Vienna University of Technology (TUW) and the University of Ljubljana (UL-BF)

Who should take this course?
This programme is designed for anyone interested in cooperative design and planning of Alpine landscapes, seeking ways to transform brownfield areas for a more sustainable and vibrant future. With a focus on classical and creative analysis methods as well as a specific landscape approach, the programme is particularly relevant to those who are interested in designing,

investing in and delivering smart brownfield transformation solutions. This programme is relevant to masters students and young professionals in the fields of urban, regional and landscape planning, landscape architects and associated design and planning disciplines. If you are a young planning expert, working e.g. at a national, regional or local development agency and if you are looking for multidisciplinary methods to solve complex planning problems in the Alpine region, then this programme will be relevant to you.

What you will learn
The trAILs online learning lab has a volume of 30 ECTS (900 working hours over 6 months) and integrates rich, interactive media such as videos, infographics and various e-learning activities as well as traditional didactic components such as written study guides (course notes). There are also opportunities for collaborative learning through discussion forums. The following sub-modules contribute to the multidisciplinary approach your learning path will take:

Welcome to trAILs online learning lab
In the first orientation week, you will be welcomed with a personal call and be introduced to your online teaching and technical support network. Begin connecting with fellow participants while exploring the navigation and tools of your online module. Be alerted to key milestones in the learning path, and review how your results will be calculated and distributed. You will be required to complete your participant profile, confirm your certificate delivery address, and submit a digital copy of your passport/identity document.

All following sub-modules will be hosted by the five partner universities in Austria, Germany, Italy and Slovenia, supported by experts from France and Switzerland. All sub-modules are closely interconnected – so be prepared for lively transdisciplinary discourse.

Module 1 (6 ECTS) - hosted by the Technical University of Munich (TUM)
Advanced landscape approach to brownfields
Learn that "landscape" is not just a term but a law and a concept that allows you to tackle complex landscape transformation problems in very innovative ways, from inventive analysis to research by design.

Module 2 (6 ECTS) – hosted by the Vienna University of Technology (TUW)
Database supported webGIS platform - generation and modelling
Use data to understand the most efficient and sustainable ways for developing and improving a transnational database supported webGIS platform covering the Alpine region in

order to provide a deeper understanding for the regional and national relevance of AILs.

Module 3 (6 ECTS) – hosted by the University of Verona (UNIVR)
Social transformation in act
Explore how successful transformation projects start in people's minds and in shared ideas; understand how local and regional stakeholders develop a stable communication network, based on collective memory and social identity, deeply rooted in the culture of the landscape.

Module 4 (6 ECTS)) – hosted by the University of Ljubljana (UL-BF)
Development patterns in industrialized rural areas
Learn how to rethink the current predicament about sustainable and flexible industrial development patterns and how to investigate the capacity of morphological fragments to accommodate different claims on a territory, enabling alternative development scenarios.

Module 5 (6 ECTS)- hosted by the Polytechnic University of Milan (POLIMI)
Progressive and adaptive transformation planning strategies
Understand the value of advanced environmental planning strategies, adapting cutting edge research by design approaches and early plan prototyping to establish a multi-scalar and multi-perspective approach to complex planning problems.

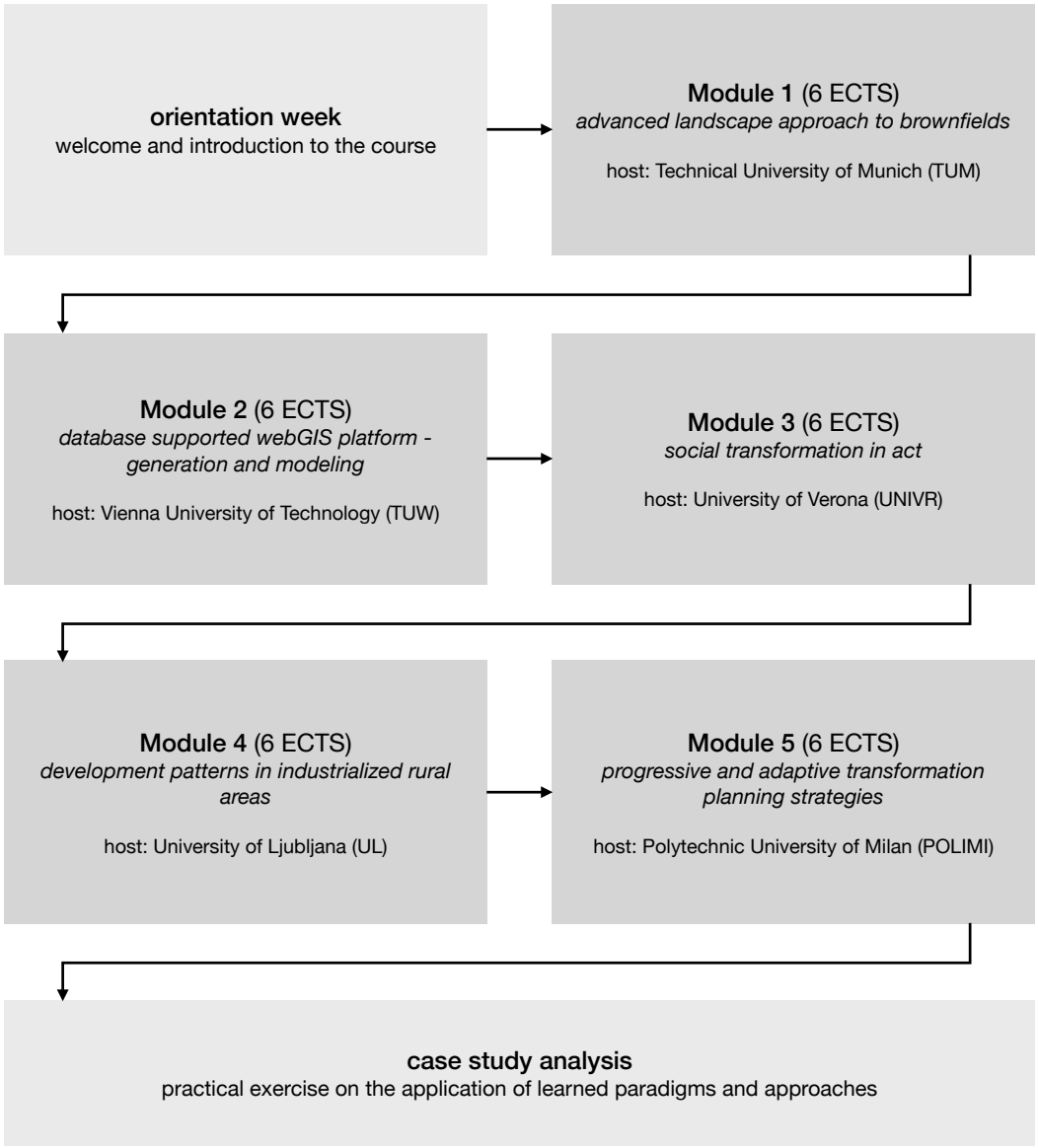
How you will learn
The programme is broken down into manageable, weekly modules, designed to accelerate your learning process through diverse learning activities:

- Work through your downloadable and online instructional material
- Interact with your peers and learning facilitators through weekly class-wide forums and small group discussions
- Enjoy a wide range of interactive content, including video lectures, infographics, live polls, and more
- Investigate rich, real-world Alpine case studies
- Apply what you learn each week to ongoing project submissions, culminating in an understanding of how strategically oriented planning approaches to brownfields can bring improvements to rural living and sustainability

Each module is released weekly, allowing a flexible but structured approach to learning. You will be supported as you engage in individual activities and group discussions, ensuring you feel confident to submit your best work at each weekly deadline.

Technical requirements
Basic requirements: In order to complete a course, you need a current email account and access to a computer, the internet, and Microsoft Excel. You should be familiar with using a computer and accessing the internet, as you may need to take part in online discussions (e.g. Zoom, GoToMeeting, etc.), read documents in PDF Reader, view Microsoft PowerPoint presentations, and read and create documents in Microsoft Word. You might also need to work with Adobe InDesign and Photoshop in order to create plans and perspectives.

Browser requirements : We recommend that you use Firefox as your internet browser when accessing the Online Campus. Although this is not a requirement, we have found that this browser performs best for ease of access to course material.


orientation week
welcome and introduction to the course
Module 1 (6 ECTS)
advanced landscape approach to brownfields
host: Technical University of Munich (TUM)
Module 2 (6 ECTS)
database supported webGIS platform - generation and modeling
host: Vienna University of Technology (TUW)
Module 3 (6 ECTS)
social transformation in act
host: University of Verona (UNIVR)
Module 4 (6 ECTS)
development patterns in industrialized rural areas
host: University of Ljubljana (UL)
Module 5 (6 ECTS)
progressive and adaptive transformation planning strategies
host: Polytechnic University of Milan (POLIMI)
case study analysis
practical exercise on the application of learned paradigms and approaches

Annex 3 : :

Partner portraits

154 Technical University of Munich

155 BSC, Business support centre L.t.d. Kranj

156 University of Verona

157 Polytechnic University of Milan

158 Vienna University of Technology

159 LAMORO Development Agency

160 University of Ljubljana

161 Architecture, Urbanism and Environment Council of Vaucluse department

162 E-institute, institute for comprehensive development solutions

163 Registered association Styrian Iron Route

Interreg
Alpine Space
trAILs
caue
trAILs
Développer et tester
des stratégies concrètes et transférables
pour transformer les friches industrielles alpines

Technical University of Munich (Lead Partner)

GERMANY

The Technical University of Munich (TUM) is a leading university in Europe and one of the "Excellence Universities" in Germany. With 43,000 students and 7,000 teaching staff, interdisciplinary and cutting-edge research focuses at TUM on the natural sciences, engineering, medicine and social sciences concerning technology issues. The Chair of Landscape Architecture and Industrial Landscapes (LAI), founded in 2009 by Udo Weilacher and since then actively involved in several industrial landscape transformation projects across Europe, leads the project according to its proven expertise. In close cooperation with LAI, the Chair of Restoration Ecology (ROEK), directed by Johannes Kollmann, provides the project with the necessary expertise in ecological restoration, vegetation dynamics and urban ecosystems. Both the chairs share excellent facilities, an established international scientific network and have a high output of publications in renowned journals.

Udo Weilacher

Landscape architect, Full Professor, PhD
Project initiator and scientific coordinator

Marcello Modica

Urban planner, Researcher
Project manager trAILs

Johannes Kollmann

Ecologist, Full Professor, PhD
Team leader ROEK

Markus Bauer

Ecologist, Researcher
Project assistant ROEK

Katharina Strobl

Ecologist, Senior Researcher, PhD
Project manager ROEK

Kerstin Bär

Ecologist, Researcher
Project assistant ROEK

BSC, Business support centre L.t.d. Kranj

SLOVENIA

BSC Kranj is a regional development agency established in 1995, covering 18 local communities in the region of Gorenjske, acting as a link between regional stakeholders and the state, responsible for the preparation and implementation of the regional development programme and the implementation of key strategic development priorities confirmed and agreed by regional development council and council of mayors. BSC also acts as a support organisation for SMEs. BSC has qualified and experienced staff having knowledge in the preparation, implementation and management of EU projects, and has expertise in the preparation of strategies, action plans, evaluation and implementation-piloting. An important challenge in the region of Gorenjske is the redevelopment of brownfield sites.

Helena Cvenkel

Regional development
Project manager BSC Kranj
Responsible Pilot Slovenia

Uroš Brankovič

Regional development
Project assistant BSC Kranj

Selma Terčon

Regional development
Project assistant BSC Kranj

University of Verona

ITALY

The University of Verona is dedicated to innovation and to maintaining the high quality of its teaching and research. The institution has 22,000 students, and 1,500 teaching and non-teaching staff all dedicated to a continual process of growth and to the development of human, structural and financial resources. The Department of Human Sciences (HS) produces quality cultural and academic teaching and research for the national and international academic community in the fields of education, psychology, philosophy, cultural anthropology and sociology. The Department of Economics (E), which promotes and coordinates teaching and research activities in the broad areas of economics and statistics, will also be involved in the project under the coordination of HS.

Veronica Polin

Economist, Senior Researcher, PhD
Project assistant UNIVR

Vincenzo Prete

Economist, Researcher
Project assistant UNIVR

Lorenzo Migliorati

Sociologist, Associate Professor, PhD
Team leader UNIVR

Liria Veronesi

Sociologist, Senior Researcher, PhD
Project assistant UNIVR

Gianluca Lanfranchi

Sociologist, Researcher
Project assistant UNIVR

UNIVERSITÀ di VERONA

Polytechnic University of Milan

ITALY

The Department of Architecture and Urban Studies is a thematic and interdisciplinary research institution of the Politecnico di Milano, established in January 2013.
The DAStU was selected among 180 Italian Departments and funded by the Ministry of University and Research (MIUR) for the period 2018-2022 as part of the "Departments of Excellence" initiative, focusing research on territorial fragilities. The Department carries out research, design experimentation and training activities in the field of architectural and urban design, spatial planning and territorial governance, urban policies, preservation and intervention on the built and natural heritage, historical and critical interpretation of architecture and the city. It is one of the most important research structures in Italy in the field of the disciplines of the city and territory, integrated in a strong international network of centres of excellence and open to different forms of co-operation with institutional and social actors at the local, national and international levels. DAStU is a member, among others, of the Association of European School of Planning (AESOP) and the European Urban Research Association (EURA).

Piergiorgio Vitillo

Architect and Urban Planner,
Associate Professor, PhD
Team leader POLIMI

Paolo Galuzzi

Architect and Urban Planner, Associate Professor, PhD
Project manager POLIMI
Since 01.11.2020 full professorship at the Sapienza University of Rome

Elena Solero

Architect and Urban Planner
Senior Researcher, PhD
Project assistant POLIMI

Gabriele Pasqui

Economist, Philosopher and Urban Planner, Full Professor, PhD
Project assistant POLIMI

POLITECNICO
MILANO 1863

TU Wien (Vienna University of Technology)

AUSTRIA

The Institute of Spatial Planning of the Faculty of Architecture and Planning and the leading Austrian unit in research and teaching in spatial planning. The goal of the Centre for Local Planning is to understand the practice, research and teaching of planning as one entity and to link them together. Local planning deals with all the space-related spheres of municipal policy and is therefore a comprehensive, interdisciplinary task. Its field of action are local authorities, irrespective of size, status and structure. In addition, inter-municipal planning tasks have to be dealt with, including their functional and spatial integration into the larger space. Implementation strategies have to be developed which take into account the influence of pan-European spatial regulations on municipal development. The Spatial Simulation Lab (Simlab) specialises in the development and implementation of visual support tools for complex planning tasks.

Andreas Voigt

Spatial planner, Associate Professor, PhD
Team leader TUW

Julia Forster

Architect and Spatial planner
Senior Researcher, PhD
Project manager TUW

Isabella Schuster

Spatial planner, Researcher
Project assistant TUW

Michael Rinnerthaler

Spatial planner, Researcher
Project assistant TUW

Julia Pechhacker

Spatial planner
Former staff member TUW

Stefan Bindreiter

Spatial planner, Researcher
Project assistant TUW

TU WIEN

raum simlab

LAMORO Development Agency

ITALY

LAMORO is a Consortium of more than 40 municipalities in the South of Piemonte region; it promotes innovative models of governance and builds shared vision. It has increased its experience by implementing projects for local sustainability and inclusive growth in the framework of ETC programmes. In the trAILs project LAMORO implements the pilot activities at the local level; it supports cooperation between public and private actors in order to implement inclusive governance processes in relation to the reconversion of disused industrial sites in peripheral valleys (for example in the area of mountain district "Valle Stura" with its strong cement industry). LAMORO will involve the Regional Authority (Piemonte Region) to share best practices and transfer methodologies in particular concerning the Regional Landscape Plan and the Regional Territorial Plan. This know-how will be at the disposal of the territory, in terms of replicability of the results (snow-ball effect).

Umberto Fava

Regional development
Director LAMORO

Sonia Abluton

Regional development
Project manager LAMORO
Responsible Pilot Italy

University of Ljubljana

SLOVENIA

The research staff at the Department of Landscape Architecture concerns itself with a broad list of topics including spatial and regional planning, policy analysis, territorial cohesion and impact assessment. In reference to the trAILs project, the staff has expert knowledge in policy analysis, models of industrial urbanization and revitalization as well as in the meaning and value of industrial knowledge and culture. Most of the research work at the department is performed in the research group "Landscape as living environment" which is partially financed by the Slovenian Research Agency. Apart from the national project, the group has been active in the programmes of transnational cooperation (Interreg Alpine Space, Interreg Central Europe, ESPON, Horizon 2020 programme). Within the ESPON project, the department developed an innovative method called Territorial Impact Assessment (TIA). In the project trAILs the UL has taken over the methodological framework of the Work Package T2 and policy assessment.

Tomaž Pipan

Architect, Senior Researcher, PhD
Project manager UL

Manca Krošelj

Landscape architect, Researcher
Project assistant UL

Naja Marot

Geographer, Senior Researcher, PhD
Project assistant UL

Univerza v Ljubljani
Biotehniška fakulteta

Architecture, Urbanism and Environment Council of Vaucluse department

FRANCE

The CAUE 84, a public service association, works daily with local authorities (municipalities/association of municipalities, department of Vaucluse) and for projects of regional or national interest, with PACA's region and the PACA's directorates of state. The CAUE is also structured by regional unions and by a national federation, improving our visibility at these different levels. Our core business is consulting in architecture, urban planning, landscape and the environment. We are very experienced in brownfield industrial site redevelopment: Plasterers of Malaucène, as part of a call for projects for a competitiveness cluster, 2006; railway site of L'Isle-sur-la-Sorgue, 2010; industrial heritage (paper industry) of Fontaine-de-Vaucluse's site, within a national programme for tourism development (Opération Grand Site 2014-2017). Redevelopment projects for municipalities (Robion 2009, St Romain-en-Viennois, 2017) and assossiation of municipalities (Pays des Sorgues, Coustellet, Pays d'Apt).

Thomas Kleitz

Landscape architect
Project manager CAUE 84
Responsible Pilot France

84 Vaucluse
c|a.u.e
Conseil d'architecture, d'urbanisme et de l'environnement

E-institute, institute for comprehensive development solutions

SLOVENIA

The EZVD is a non-profit institute, established in 2003, and today employs 8 experts. Together with external researchers it operates as the research group "Smart Lab" where new systems of sustainable management are developed. The EZVD have done some pioneering work in Slovenia, such as the Sustainability Impact Assessment of Hydropower Utilisation of Mura River and others. It operates as a cluster manager of a Smart City Maribor triple-helix research driven cluster (www.smartcitymaribor.si) through which it introduces new sustainable development approaches and methods to the city and region. It has rich experience in the implementation and management of different EU projects, as well as consulting for enterprises and local communities on sustainable development issues.

Zlatka Zastavnikovič

Economist, Project manager
Communication manager trAILs

Registered association Styrian Iron Route

AUSTRIA

VESTE is a development agency comprising 18 municipalities in the industrial & mining district of Leoben in the Alpine part of the state of Styria. As a key player for regional development it is able to build on 30 years of experience. The topics covered are urban revitalization, industrial culture & heritage and economic development. In recent decades it has handled over €20 million in regional development investment. The Styrian Iron Route has a 1300 year long history of ore mining. The "Erzberg" ("ore mountain") with its open-cast mine is one of the impressive remains. The mining led to a prospering and still on-going steel industry; on the other hand, large industrial sites have been abandoned in recent years. The NGO's members are the region's municipalities (including Leoben, Styria's second biggest town) and the state of Styria.

Kornelia Lemmer

Regional development
Project manager VESTE
Responsible Pilot Austria

Heidi Pichler

Regional development
Project assistant VESTE

VEREIN STEIRISCHE EISENSTRASSE

Picture credits : :

Picture credits

Preface

figure 1, page 5: Udo Weilacher (TUM)
figure 2, page 5: Udo Weilacher (TUM)

Framework

figure 1, page 8: Udo Weilacher (TUM)
figure 2, page 8: Theresa Finkel (TUM)
figure 3, page 9: Elena Solero (POLIMI)
figure 4, page 11: Marcello Modica (TUM)

Pilots

figure 1, page 14: © Bwag, 2015
figure 2, page 16: Archiv Stadtmuseum Eisenerz
figure 3, page 16: Manca Krošelj (UNI LJ)
figure 4, page 17: Gerfried Tiffner (VESTE)
figure 1, page 18: Udo Weilacher (TUM)
figure 2, page 20: Marcello Modica (TUM)
figure 3, page 20: Marcello Modica (TUM)
figure 4, page 21: Udo Weilacher (TUM)
figure 1, page 22: Udo Weilacher (TUM)
figure 2, page 24: Martin Augenstein (TUM)
figure 3, page 24: Marcello Modica (TUM)
figure 4, page 25: Marcello Modica (TUM)
figure 1, page 26: LAI, TUM
figure 2, page 28: Gorenjski muzej, license CC BY-NC
figure 3, page 28: Lars Hopstock (TUM)
figure 4, page 29: LAI, TUM

Mapping

All illustrations are © of the Technical University of Vienna.

Assessment

The AILs: assessment procedure
All illustrations are © of the University of Ljubljana.

Policy assessment
All illustrations are © of the University of Ljubljana.

Spatial and functional assessment
All illustrations are © of the University of Vienna and the University of Milano.

Socioeconomic assessment
All illustrations are © of the University of Verona

Environmental assessment
figure 1, page 87: Katharina Strobl (TUM)
figure 2, page 88: Katharina Strobl (TUM)
figure 3, page 88: Katharina Strobl(TUM)
figure 4, page 89: Kerstin Bär (TUM)
figure 5, page 89: Kerstin Bär (TUM)
figure 6, page 90: Kerstin Bär (TUM)
figure 7, page 91: Kerstin Bär (TUM)
figure 8, page 91: Kerstin Bär (TUM)
figure 9, page 92: Katharina Strobl (TUM)

Developed tools
figure 1, page 95: Udo Weilacher (TUM)
figure 2, page 95: Manca Krošelj (UNI LJ)
figure 3, page 96: Manca Krošelj (UNI LJ)
figure 4, page 97: University of Ljubljana
figure 5, page 99: University of Ljubljana
figure 6, page 99: University of Ljubljana
figure 7, page 100: Manca Krošelj (UNI LJ)
figure 8, page 101: Manca Krošelj (UNI LJ)
figure 9, page 102: Manca Krošelj (UNI LJ)

Testing

What is the test-design tool for and how it works
figure 1, page 107: Zlatka Zastavnikovič (BSC)
figure 2, page 107: Elena Solero (POLIMI)
figure 3, page 111: Massimo Galuzzi (POLIMI)

Planning recommendations
figure 1, page 112: © TWIGG
Maps, pages 114-123: © POLIMI

Conclusions

© Marcello Modica (TUM) and Udo Weilacher (TUM)

Annexes

In collaboration with all the trAILs partners.

Front envelope inside

In collaboration with all the trAILs partners.

Back envelope inside

Map "Alpine Industries": © Marcello Modica

Final Credits

IMPRESSUM

EDITORIAL OFFICE
Under the guidance of the Technical University of Munich Prof. Dr. Udo Weilacher (TUM) and Marcello Modica (TUM), this publication was created in cooperation with all the trAILs partners.

LAYOUT
EDITING
Prof. Dr. Udo Weilacher
Marcello Modica
Antonia Koukouvelou

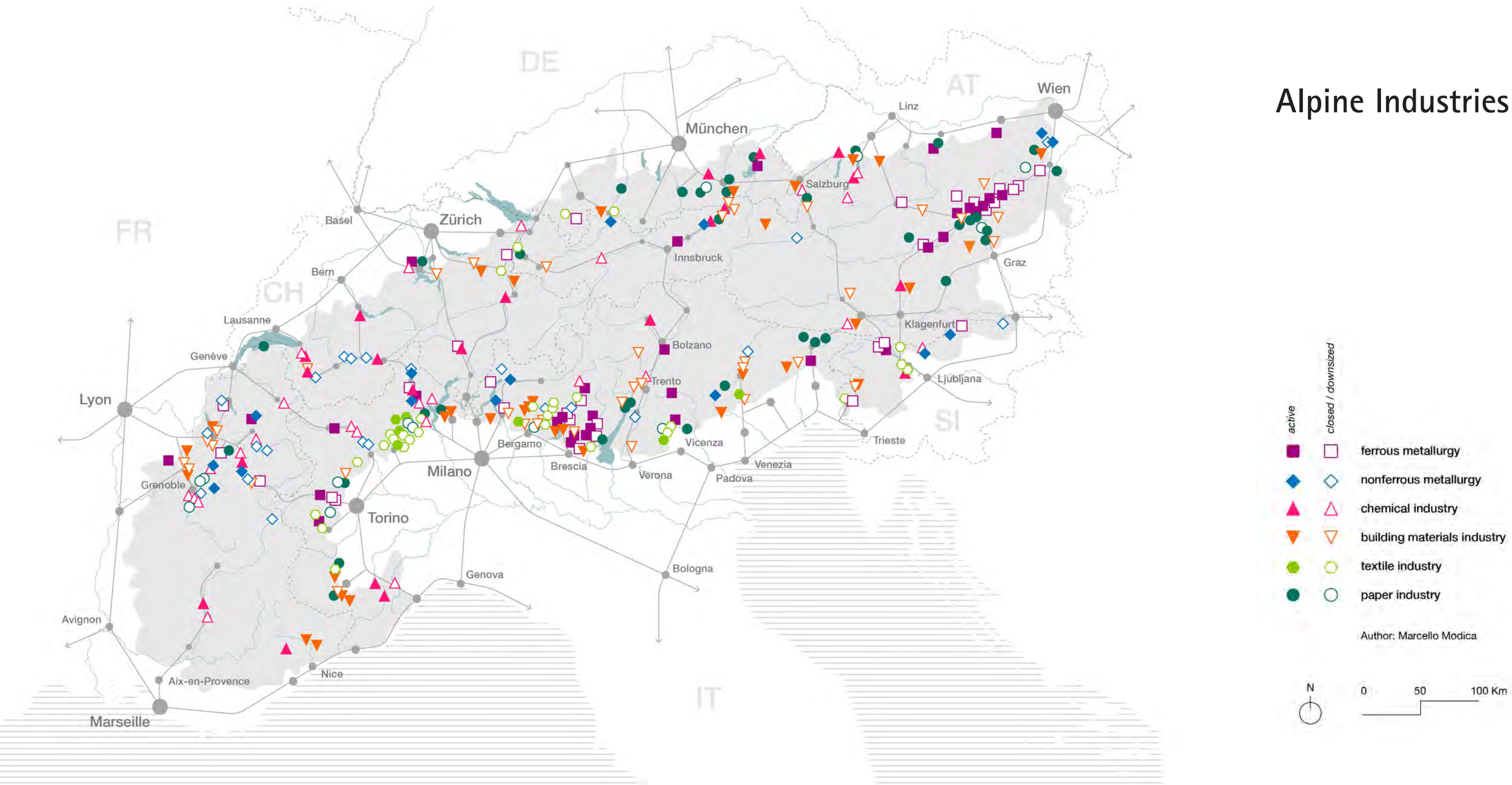
PROOFREADING
Kern AG
https://www.e-kern.com/de/

PRINTING
Druckerei Joh. Walch GmbH & Co. KG,
Im Gries 6, 86179 Augsburg

ISBN 978-3-948278-24-3

PUBLISHER
Technical University of Munich
Faculty of Architecture
Arcisstr. 21, 80333 Munich
www.ar.tum.de
verlag@ar.tum.de

Alpine Industries



EUROPEAN UNION

LANDSCAPE ARCHITECTURE
AND INDUSTRIAL LANDSCAPE
PROF. DR. UDO WEILACHER
DEPARTMENT OF ARCHITECTURE
TECHNICAL UNIVERSITY OF MUNICH

ISBN 978-3-948278-24-3

The EU-project trAILs (2018-2021) was co-financed by the European Regional Development (ERDF) within the Interreg Alpine Space Programme of the European Union.