ASTUS –

A TERRITORIAL ALPINE SPACE

TYPOLOGY

Project Output O.T1.1

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1) State of the Art: Alpine Space typologies

There are several different approaches on typologies for alpine landscapes. In the document "Strategy Development for the Alpine Space 2014+" (Alpine Space Programme 2013) five different types of regions are differentiated. These types are *alpine metropolises, alpine cities, stable and growing rural areas, rural areas with decreasing development* and *touristic area*. They are specified by different indicators like population, connection to other cities, functional characteristics or mobility offers.

A general way to differentiate between types of regions, not only for alpine space, is published by the German institute for Bau-, Stadt und Raumforschung (Building-, City- and Space research). Based on different categories, regions can be divided using different indicators. The first step is to look at the location of the pilot site. It can be very peripheral, peripheral, central or very central. The other way to split up regions is by using the settlement information of a site and distinguishing between rural, partly urban or predominantly urban. Urban regions are characterized by the availability of a city with about 500.000 inhabitants, as well as a value of 50% of people living in medium and big sized towns. The population density is at least 300 inhabitants per km². Regions with an urban tendency have at least 33% of their inhabitants living in big and medium sized cities, having a population density between 150 and 300 inhabitants per km². Also if there is at least one bigger town and a population density at the minimum of 100 inhabitants per km², without regards to the bigger cities. Rural regions are characterized by less than 33% of residents, living in large and medium sized towns, having a population density less than 150 inhabitants per km², as well as regions with a bigger city, but with a population density of less than 100 inhabitants per km², without regards to bigger cities. (BBSR, 2017)

Another classification, introduced by the OECD, is the Regional Typology. This classification works on two levels. First rural areas, with less than 150 inhabitants per km² are identified. In the second step a classification of NUTS 3 regions into three categories is performed. These categories are: Predominantly rural (with more than 50% of inhabitants living in rural areas), intermediate (15-50% of the residents live in rural areas) and predominantly urban (less than 15% live in rural areas). (Statistik Austria, 2016)

The European commission uses an Urban-Rural Typology, another classification that works on two levels. First, based on a 1km raster grid cell, urban clusters and rural grid cells are identified. Raster cells that are next to each other, with more than 300 inhabitants per km² that cover more than 5.000 inhabitants, result in an urban cluster. Raster grid cells with less than 300 inhabitants per km² or more, if they result in less than 5.000 inhabitants with their neighbouring cells, are seen as rural grid cells. In the next step the NUTS 3 regions are diversified into predominantly rural (more than 50% of the inhabitants live in rural grid cells), intermediate (20-50% live in rural grid cells) and predominantly urban (less than 20% live in rural grid cells). (Statistik Austria, 2016)

Other typologies can be found in the literature, for an example in Becker (1988), where regions are classified based on territorial circumstances, physical-geographical utilization potential, demographic development potential and national settlement systems. Carolin Pecher et al. (2013) use spatial-pattern indicators to define a typology of alpine space. They use 25 indicators, consisting of infrastructure, landscape pattern, landscape composition and topography. The resulting patterns were then ordered towards six cluster types: "*Non-mountainous cultural landscapes", "poorly structured agricultural landscapes", "agricultural landscapes, interspersed with highly structured semi-natural and natural areas", "remote, highly structured cultural landscapes with a high level of insolation", "mountainous, forested area"* and "*mountainous, semi-natural and natural open areas".*

2) ASTUS Typology

2.1. Framework

In the application form of ASTUS project, the transnational typology of alpine territories is defined as "Comparative analysis of alpine territories based on a territorial sample (PS) representing existing different alpine contexts regarding transport and settlements, spatial planning, mobility practices and experiences". Therefore, the typology is carried out in order to investigate alpine territorial dynamics and legal backgrounds upon which ones ASTUS is built.

Based on the application form, the framework conditions can be defined as follows:

Requirements:

- Representative for the whole alpine space
- Integrating alpine territorial dynamics
- Integrating alpine contexts like transport and settlement, spatial planning, mobility practices / experiences etc.

Aims:

- comparative, transnational typology of alpine territories
- indicate regions with similar challenges, needs, options and conditions in the course of low CO2 solutions and strategies
- capitalize specific information, experiences and practices of the questionnaires from each PS as representatives for the alpine space

Purpose:

- develop a typology which is feeded with relevant information/interim project results and knowledge during the whole project
- Basis for WP2, WP3
- Utilization for other alpine space territories
  -> clear distinction between territorial characteristics, options and needs
  -> provide potential low CO2 strategies, solutions, tools and scenarios for each type which can be utilized by each similar region

2.2. Methodology

According to the aim and requirements within ASTUS project a transnational territorial typology is designed to fit any territory in the Alpine Space in respect to low CO2 solutions in the field of transport and settlement, spatial planning, mobility practices and experiences. The typology meets the requirement to group areas with similar characteristics and trends and to distinguish between areas with dissimilar ones by applying them to different categories.

Based on a comparative analysis of 17 pilot sites in five countries (SI, IT, AUT, D, F) as representatives for the alpine space and referring to existing alpine space typologies (see previous chapter) a transnational typology is developed, addressing the field of low CO2 solutions against the background of integrated transport and settlement planning. Following a bottom up approach crucial characteristics of the territorial samples (PS), evidenced within the questionnaires of each pilot site, determine the ASTUS territorial typology. Specific information, that is relevant for working on low CO2 solutions, is provided by the questionnaires in respect to main territorial features, mobility supply and demand, mobility and spatial planning background, strengths, weaknesses, opportunities and threats, best practices and experiences to share as well as tools for mobility and spatial planning (comp. Figure 1). Therefore, an extensive amount of the territory's characteristics is the basis for the comparative analysis. Within the comparative analysis of the pilot sites, crucial characteristics, which determine low CO_2 solutions in respect to integrative transport and settlement planning, are identified and grouped into categories in respect to territorial aspects, population aspects, economic aspects, public transport aspects, and solutions for low CO2 mobility in the pilot site

To ensure the transferability of the designed ASTUS typology to any area in the Alpine Space, the results of the comparative analysis are aligned to existing Alpine Space typologies.

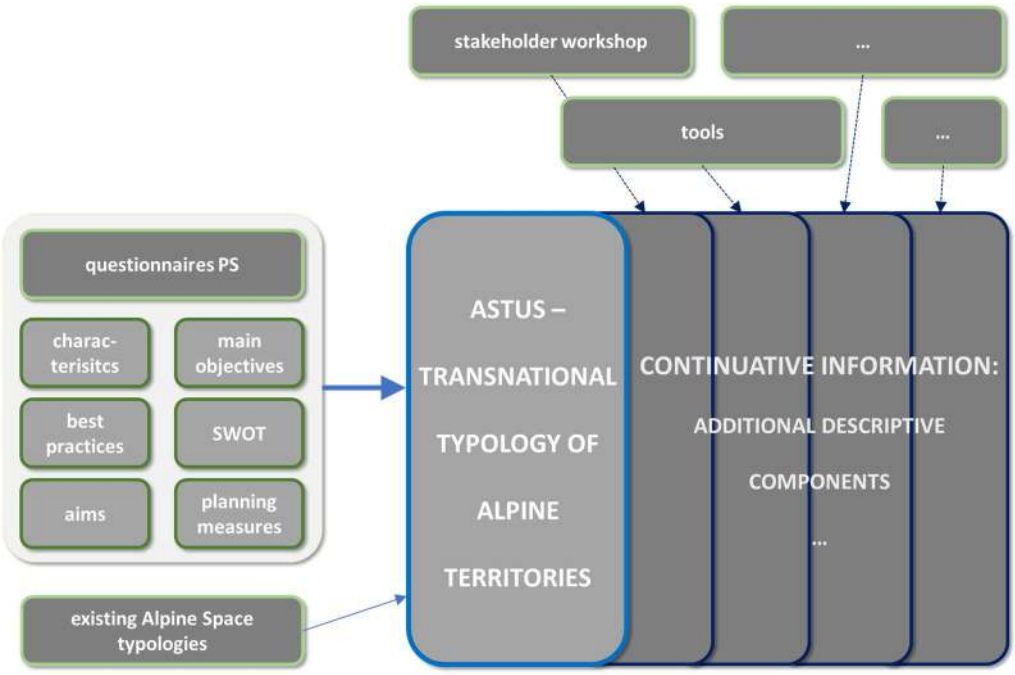

Figure 1: Concept of the ASTUS territorial typology

As the typology is provided in a tabular form, further descriptive components, that contribute information to specific pilot sites or ASTUS territorial types in respect to CO_2 tools, CO_2 effects of potential local mobility and planning solutions, low CO_2 solutions and experiences in its implementation, can be added over the project time (comp. Figure 1). Hence, the typology meets the requirement of being a document in progress during the whole project period.

2.3. Structure of the typology and description of the ASTUS territorial types

The ASTUS territorial typology is provided in a tabular form consisting of columns describing the region types. As the typology is a work in progress document, the possibility of adding further information over the project time is considered within the typology concept and structure. The ASTUS territorial typology exists of seven types, which represent each area in the alpine space in respect to low CO_2 mobility and settlement option. These **ASTUS region types** are listed and described in Table 1 and named metropolitan regions, alpine cities, alpine towns, stable rural regions (with functional centre), rural regions with declining development, touristic regions.

As the Alpine Space is characterized by heterogeneous areas influenced by different alpine contexts in the course of transport and settlements, functional, topographical and social issues as well as mobility practices and experiences, the description of the region types serves as a qualitative description. Therefore, not all aspects in the description are binding in the course of assigning alpine space regions to a specific region type of the ASTUS typology.

Region type	Description
Metropolitan core area	● > 750.000 inhabitants[1] OR 1.500 inh/km² (population density)[2] OR high settlement density more than 3.000 inh/km² ● excellent or very good public transport supply**Erreur ! Signet non défini.** (public transport quality: I or II[3]) ● among the leading European regions in terms of connections to high speed transport networks (train / motorways / international airports) and ICT endowment[1] ● extensive suburban area with several hubs and significant commuter flows[1] ● R&D centres with global significance[1]
Cities	● > 50.000 inhabitants[4] OR > 300 inh./km² (population density)[5] and high settlement density**Erreur ! Signet non défini.** within the city ● at least very good public transport supply (public transport quality: II[3]) with an inner-city transport system**Erreur ! Signet non défini.** ● connection to high speed transport networks (railways/motorways)[4] ● suburban area with relevant commuting share[4] ● R&D centres[4]
Towns	● > 20.000 inhabitants OR > 150 inh./km² (population density) within the town ● compact settlement pattern in the core, scattered settlement patterns in

[1] Description of territorial type "Metropolises" in Alpine Space Programme 2013

[2] Description of the class "high density clusters" in Degree of Urbanisation of the European Commission (Statistik Austria 2016)

[3] Developed Scheme for public transport quality assessment, see chapter 2.4

[4] Description of territorial type "Alpine cities" in Alpine Space Programme 2013

[5] Description of the class "urban clusters" in Degree of Urbanisation of the European Commission (Statistik Austria 2016)

	suburbs**Erreur ! Signet non défini.** ● supra-regional functions**Erreur ! Signet non défini.** ● at least good public transport supply (public transport quality: III[3]) without any real inner-city transport system**Erreur ! Signet non défini.** ● high commuter volume**Erreur ! Signet non défini.**
Growing regions bordering on a metropolitan core area	● > 250 inhabitants/km² (population density) OR high settlement density (>1500 inhabitants/km²)**Erreur ! Signet non défini.** ● stable or growing population[6] ● suburban characteristics**Erreur ! Signet non défini.** ● access to local or regional transport network with good service quality (at least public transport quality: III[3]), good to very good connectivity to a metropolis or city[6] ● GDP per capita 80%-100% of average[6] ● significant share of workers employed in cities and metropolis[6], high ratio of out-commuters**Erreur ! Signet non défini.** ● strong interlinkages to the neighbouring metro region including transport axis[6]
Stable rural regions (with functional centres)	● moderate settlement density (> 500 inhab./km²) OR moderate population density (> 75 inhabitants/km²)**Erreur ! Signet non défini.** ● predominantly rural area characterized by urban sprawl**Erreur ! Signet non défini.**, functional centres in between ● constant population development**Erreur ! Signet non défini.**, above-average ageing**Erreur ! Signet non défini.** ● access to local or regional transport network with good service quality (at least public transport quality: III[3])[6] ● high ratio of out-commuters to regional/supra-regional centres/ workplaces**Erreur ! Signet non défini.**
Rural regions with declining development	● low settlement density (< 500 inhab./km²) and low population density (< 75 inhabitants/km²)**Erreur ! Signet non défini.** ● declining population[7] ● above-average ageing population[7] ● GDP/capita below 80% of average[7] ● small ratio of employees working outside the region[7] ● good or basic public transport supply (public transport quality: III or IV[3]), poor transport connection to towns and cities**Erreur ! Signet non défini.** ● weak connectivity to next city or metropolis[7]
Touristic regions	● tourism is one of the main economic sectors[8] (overnight stays / inhabitants > 100 OR beds / inhabitants > 0,6)**Erreur ! Signet non défini.** ● high land/property prices[8] ● immigration of elder and outmigration of younger people[8] ● highly seasonal activity[8]

Table 1: ASTUS territorial typology- Types and description

[6] Description of territorial type "Stable or growing rural areas" in Alpine Space Programme 2013

[7] Description of territorial type "Declining rural areas " in Alpine Space Programme 2013

[8] Description of territorial type "Tourism areas" in Alpine Space Programme 2013

2.4. Specific characteristics of the ASTUS territorial types according to the territorial samples

As specific Alpine regions within one ASTUS territorial type have slightly dissimilar characteristics, the actual properties of the type-specific pilot sites are provided in accordance to the information given by the questionnaires. Therefore, the range of potential characteristics is demonstrated. Moreover, further columns to specific low CO_2 actions, strategies, tools or plans in a pilot site can be added over the project time to obtain a portfolio of relevant information. Within this chapter all relevant specifications of the pilot sites are listed and explained including derived indicators in line with the tabular form of the ASTUS territorial typology. The information derived from the questionnaires are provided within five categories: territorial characteristics, population, economy, transport and solutions for low CO2 mobility in the pilot site.

In Figure 2 an extract of the tabular structure of the ASTUS territorial typology is visualized. For each region type a **description** is provided (comp. Figure 2), which specifies its territorial, social, economic and transport characteristics. Moreover, **"best practiced" low CO2 solutions** are identified for each ASTUS territorial type, eg. express lines, smart ticketing, transboundary connections . Attached to the general information of the ASTUS typology, the representative pilot sites are assigned to the respective type with its specific information. In accordance to the questionnaires, specific information of each PS is given in the course of its territorial, social, economic and transport characteristics as well as planning measures, main objectives, and aims of the territorial samples (PS).

Region type	Description	"Best practiced" low CO2 solutions	Pilot Site	territorial characteristics				population			working p
				area	topography	settlement structure	settlement density	population density	population (Inhab.)	trend	% of population
Metropolitan regions	• > 750.000 inhabitants OR 1.500 inh/km² (population density) and high settlement density • excellent or very good public transport supply (public transport quality: I or II) • among the leading European regions in terms of connections to high speed transport networks (train / motorways / international airports) and ICT endowment • extensive suburban area with several hubs and significant commuter flows • R&D centres with of global significance	• car-sharing • share taxi system • participation of residents • local initiatives on settlement development & mobility	City of Munich	310 km²	flat	City with sub-centers	-	4668 Inhab./km²	1.521.678	increasing[1]	58,9%[4]
			Municipality of Haar	12.9 km²	flat	compact settlement structure in the center and several rural villages	4,077 Inhab./km²	1590 Inhab./km²	20.513	increasing[1]	40,0%
			Municipality of Neubiberg	5.76 km²	flat	low and middle density settlement structure around the 2 old small centers	4,284 Inhab./km²	2428 Inhab./km²	14.010	constant[1]	33,0%
Alpine cities	• > 50.000 inhabitants OR > 300 inh./km² (population density) and high settlement density within the city • at least very good public transport supply (public transport quality: II) with an inner-city transport system • connection to high speed transport networks (railways/motorways) • suburban area with relevant commuting share • R&D centres	-	*No example from ASTUS pilot sites; other European examples e.g. Grenoble, Chambéry, Annecy, Salzburg, Innsbruck, Bolzano, Trento*								
	• > 20.000 inhabitants OR > 150 inh./km² (population density) within the town • compact settlement		City municipality of Nova mesto	235.7 km²	hilly, prevailing karst	Compact settlements in the centre of the municipality, scattered	702.4 Inhab./km² urban settlement	154,7 Inhab./km²	36.480	constant (increasing)[2]	40,5%

Figure 2: Extract of the tabular ASTUS territorial typology

Territorial characteristics

The **area** of the pilot site [km^2] is a relevant information due to the fact, that the pilot site's area differ from less than 10km^2 (municipality of Neubiberg) to more than 1500 km^2 (Regional Association of Pongau, Pays Ledonien). Hence, the area of the pilot site reflects different scales of reference. This information is relevant relating to other characteristics (eg settlement density, population density, number of inhabitants, number of out-/in-commuter). The **topography** provides information about geomorphological specifications and the location of the pilot site within the Alpine space like flat, hill, mountainous, valley, basin landscape, foothills, and many lakes. Due to the fact, that some topographical characteristics foster or hinder low CO_2 solutions, this information is essential to provide a transnational typology for the Alpine space region. The **settlement structure** and the **settlement density** (= number of inhabitants/ settlement area) inform about the recent settlement situation in the pilot site, whether, the settlement structure is compact, dispersed or disconnected as well if there are structuring transport axis. The settlement density indicates whether the pilot site is sparsely or densely populated in respect to the settlement area.

Population

Social characteristics in respect to the **population density,** the **number of inhabitants**, and the **population trend** are provided for each pilot site. The population density is the number of inhabitants per area of the pilot site and reflects implicitly, by comparing to the settlement density or the area of the pilot site, the share of non-settlement areas. Moreover, the number of inhabitants varies because of different settlement and population densities as well as because of the dissimilar area size of the pilot sites. Therefore, the number of inhabitants and the area of the pilot site are crucial indicators for further interpretations.

Economy

Economic characteristics also reflect aspects of the financial situation, functional characteristics and the volume of daily transport activities (esp. commuter) within the pilot site. Against this backdrop, the absolute and relative number of worker are provided for each pilot site derived from the questionnaires. In addition, the absolute **numbers of in- and out-commuter** for each pilot site are listed. The **commuter balance** represents the difference between in- and out-commuter and indicates a surplus of out-commuter (negative balance) or in-commuter (positive balance). Due to the different size of the pilot site and the dissimilar number of citizens, the absolute numbers of in- and out-commuters can be interpreted in combination of specific territorial characteristics, e.g. area, number of working population, number of inhabitants. Moreover, the main functional characteristics describing special functions of the territory like touristic, educational, recreational, residential or economic functions. Furthermore, the number of workplaces and employees are provided based on the questionnaires. Touristic functions have an influence on the classification scheme of the typology. Therefore, the number of overnight stays per inhabitant and the number of beds per inhabitant characterize the touristic function of the territory. Hence, touristic regions can be identified.

Transport

In the course of mobility aspects and transport characteristics within the pilot site, the provision of **means of transport** are listed (inner-city transport system like metro, tram; rail like urban, regional or long-distance train; bus like a local or regional bus). Moreover, the **shortest interval** and the **travel time to the next regional centre** are indicators for the quality of the public transport supply. In that course, a composed indicator called "PT-quality" is determined based on these three transport aspects. In Table 2 the underlying evaluation scheme of the public transport supply is visualized.

	means of transport	Urban & Rail & Bus					Rail & Bus					Bus				
	shortest interval	<5	5-15	15-30	30-60	>60	<5	5-15	15-30	30-60	>60	<5	5-15	15-30	30-60	>60
travel time to the next reg. centre	< 15 min OR next centre within the PS	I	I	II	II	IV	I	II	II	III	IV	II	II	III	III	IV
	15-30 min	I	II	II	III	IV	I	II	II	III	IV	II	II	III	III	IV
	30-60 min	II	II	III	III	IV	II	II	III	IV	IV	III	III	IV	IV	IV
	> 60 min	II	III	III	IV	IV	III	III	IV	IV	IV	III	III	IV	IV	IV

Table 2: Evaluation scheme of the public transport supply

I	excellent public transport supply
II	very good public transport supply
III	good public transport supply
IV	basic public transport supply

Table 3: Categories of public transport qualities

Depending on the means of transport, the shortest interval and the travel time to the next regional city, a category from I (excellent public transport supply), II (very good public transport supply), III (good public transport supply) to IV (basic public transport supply) is assigned to each pilot site (comp. Table 3). This evaluation scheme is designed to give a brief overview of the transport supply situation in the pilot site. Nevertheless, a detailed analysis of all relevant transport aspects is necessary.

To provide a portfolio of alternative mobility solutions, a column **supplementary mobility offers and initiatives** is added with information of the questionnaires. Therefore, recent mobility solutions in the pilot sites are listed and serve as additional information layer.

Solutions for low CO2 mobility in the pilot site

Within this group, recent and potential fields of actions regarding low CO_2 solutions are listed according to the questionnaire which help to assess recent issues in respect to low CO_2 solutions in different ASTUS region type and pilot sites. In that course, **best practices & experiences of reduced CO_2 mobility projects to share, main objectives & guiding principles linked with mobility issues** as well as the identified **strengths, weaknesses, opportunities and threats per pilot site** are provided within the tabular form of the typology.

All in all, most relevant indicators should be similar at most within one region type and dissimilar at most between the region types. Moreover, this additum of the pilot site characteristics is a work in progress document. Relevant information layers, gained within the ASTUS project, will be added within the project period time by all PP.

2.5. Continuation and further development of the typology

As already mentioned, the ASTUS transnational typology is a work- in-progress document during the whole project. At the end of WP1 it is filled with relevant information of the questionnaires and completed with further important data. In order to meet the purpose of providing a typology for other alpine space territories and offer them low CO2 strategies, solutions, tools and scenarios appropriate for their type of territory, there are still some further developments necessary. Thus, the developed table is not only a basis for developing tools (WP2) and scenarios (WP3).

There should also be a kind of feedback loop for feeding the typology with further results of the project, like e.g.:

- Which tools/software products are already used within the PS?
- What do PS expect from new ASTUS tools and further developments of existing tools?
- Which concrete tools are implemented in which PS during ASTUS project and for which purpose?
- Which local low CO2 scenarios are derived?
- Which low CO2 strategies are identified?
- Which action plans per pilot sites are elaborated?

In addition to these contextual extensions, it is also possible to include further indicators relevant in terms of addressing low CO2 options, strategies and solutions. Improvements and additions are also welcome in order to keep the typology up to date during the whole project.

References

Alpine Space Programme 05/2013 (2013): Strategy Development for the Alpine Space. Final Report.

BBSR – Bundesamt für Bau-, Stadt- und Raumforschung (2017): INKAR 2017 – Erläuterung zu den Raumbezügen

Becker, F. (1988): Typisieren von Räumen in Entwicklungsländern: Aspekte zur Konzeption und Problematik eines planungsorientierten Ansatzes, in: Geographische Zeitschrift, 76 Jahrg. H. 4, 208-225

Pecher, C.; Tasser, E.; Walde, J. & Tappeiner, U. (2013): Typology of Alpine region using spatial-pattern indicators, in: Ecological Indicators 24, 37-47

Statistik Austria (2016): Kurzbeschreibung internationaler Verfahren zur Klassifikation von Stadt und Land.