



Collecting solid evidence to assess the needs to be addressed by Interreg cross- border cooperation programmes (2015CE160AT044)

Final report

Written by SWECO, t33, Politecnico di Milano, Nordregio
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(2015CE160AT044)**

Final report

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Abstract

This study identifies the main obstacles and potential (needs) for development and growth in cross-border regions. The most significant needs, which are suitable and affordable for Interreg programmes, are mapped through a set of indicators built-up at a territorial NUTS3 level. The database reports 25 indicators, which allow for comparisons between the 62 border regions, of which 45 are land and 17 are maritime border regions. The obstacles covered by the study are socio-economic, physical, cultural and related to normative and institutional barriers. The potential for growth is linked to competitiveness, market integration, the presence of social and human capital, the delivery of public-services in urban areas and the management of natural resources. The most relevant needs, i.e. those with a high impact on social, economic and territorial cohesion, should be given priority at territorial level by public interventions. Furthermore, the study recommends that new cross-border indicators be developed, that are not available at the moment but would be useful to quantify the needs in a mid-term outline.

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ABBREVIATIONS

CBC	Cross-border cooperation
EPO	European Patent Office
ETC	European Territorial Cooperation
ESPON	European Spatial Planning Observation Network
EU	European Union
GIS	Geographic information system
GDP	Growth Domestic Product
NUTS	Nomenclature of territorial units for statistics
R&D	Research and Development
TFEU	Treaty on the Functioning of the European Union

GLOSSARY

Border obstacles	Barriers to growth, development and cooperation at cross-border level. Obstacles are normative, institutional, physical, cultural and socio-economic.
Border regions	Regions located on land and maritime borders between EU Member States, Norway, Switzerland, Liechtenstein and Andorra. In the database, the study identifies border regions as including two countries.
Border area	A 25 kilometres (km) buffer zone on both sides of the border.
Strategic resource	A specific asset or resource, in a border region, strategic for development and growth.
Indicators	Can be aggregated, sector-based or specific representations of flows or stocks, as well as perceptions and opinions. Units of measurement are diverse.
Maritime border	Defined at European Commission level, taking into account the coastline distance between two countries, islands and coastal geographical specificities.
Needs	Obstacles and potential for cooperation, growth and development at cross-border level.

EXECUTIVE SUMMARY

This study identifies the main obstacles and potentials (needs) for development and growth in cross-border regions. The needs were identified through a literature review, selected interviews with stakeholders, as well as a review of 57 CBC programmes from 2014-2020.

After identifying the needs, the study analyses: (a) the **suitability** (*Does it fit with CBC programmes?*); (b) **affordability** (*How much would it cost?*); and (c) **relevance** (*How important is it to reach the TFEU objective of economic, social and territorial cohesion?*) of each identified obstacles and potentials for CBC policies beyond 2020.

The obstacles and potentials were mapped for the border regions through indicators. This mapping used a database, developed for the study, that includes 25 up-to-date and harmonised indicators aggregated at the border region level and available at the 2013 NUTS3 level. There is information at a lower territorial level, the **border area**, defined as a 25 km buffer zone on both sides of the border.

Border regions are located on land and maritime borders between two countries, encompassing EU Member States, Norway, Switzerland, Liechtenstein and Andorra. In total, the study identifies **62 border regions**, of which 45 are land and 17 are maritime border regions.

The database can support future decisions on programmes as well as comparative analysis of border regions. First of all, there are values for each indicator in each border region and a ranking of border regions for each obstacle and potential. Secondly, the database can provide insights on each specific border obstacle and potential. In addition, the database can be used to review the geographic, demographic, institutional and economic features of border regions.

The methodological approach is limited, as up-dated indicators are not always available at the proper territorial level. To improve any quantification of needs, the study proposes additional indicators that should be developed in cooperation with the EU and Member States' statistical offices. The research team suggests the following indicators to be prioritised:

- the number and types of roads crossing the border;
- traffic bottlenecks in public transport along the border;
- the number of searches for job offers across the border;
- location of urban services;
- the number of cross-border agreements between institutions.

Furthermore, the study recommends a regular update of the indicators in the database, based on statistical sources at EU level such as Eurobarometer, Eurostat and ESPON.

Main obstacles and potentials

The main obstacles relate to:

- **socio-economic disparities** in economic structures and behaviours;
- **physical obstacles**, which limit access across borders;
- **cultural obstacles**, including linguistic barriers, cultural differences and lack of trust in people living beyond the border;
- **normative and institutional obstacles** due to different organisations, procedures and rules.

The main types of potential are:

- **regional competitiveness** related to product innovation, industrial and cultural attractiveness;
- **market integration**, including labour market;
- **human and social capital** available in cross-border regions;
- integrated delivery and development of **public services in urban cross border areas**;
- **shared management of natural resources**.

Obstacles and types of potential cover many economic sectors and fields suitable for public intervention via CBC, such as:

- infrastructure (physical barriers);
- transport and labour market (market integration);
- innovation and business activities (competitiveness);
- supply of services in urban areas (urban cross border services);
- education, training and social activities (human and social capital); and
- natural resources (green, natural and protected areas).

Normative and institutional obstacles cut across all sectors and mainly relate to health, transport and environmental risk management.

Obstacles and types of potential also differ in terms of affordability for Interreg programmes. The affordability ranks from low, for investment in new infrastructure addressing physical obstacles, to high, for intangible assets, e.g. cultural obstacles or human and social capital. A majority of needs are highly affordable for CBC programmes.

Obstacles and types of potential in a border region are a signal for public or private intervention. However, simply identifying these obstacles and types of potential is not enough. Sometimes, addressing obstacles and tapping types of potential does not produce a significant impact on the regional economy. For instance, tapping growth potential from the creation of pure knowledge requires the capacity to turn such knowledge into a marketable product, which is not necessarily found in that border region. Thus, to identify the efficiency of EU intervention in border regions via CBC, the study also analysed the policy relevance to the TFEU objective of economic, social and territorial cohesion. Based on the data collected by the research team, **the relevance is generally high for legal and normative obstacles, as well as for obstacles linked to cultural and language barriers.** Overcoming these obstacles through specific policies should allow regions, when the obstacle is great, to realise their potential more effectively with significant impact on economic, social and territorial cohesion. Interventions addressing physical obstacles and socio-economic disparities are normally less relevant.

The most relevant types of potential are related to competitiveness (for product innovation and the development of industrial and cultural activities) and **social and human capital** (education, training and support for social cohesion). Addressing other types of potential is less relevant for socio-economic and territorial cohesion.

Mapping obstacles and types of potential across border regions

The study identifies clusters of border regions based on economic performance (GDP per capita and GDP growth), demographic features (density, population size, population growth) and EU membership.

Growing regions (GDP profile)

High GDP per capita and growing land border regions are located in northern and western Europe¹. In 17 of these regions with comparatively

¹ Border regions with GDP per capita higher than the average of border regions. This category includes the following border regions: AT-CH, AT-DE, AT-HU, AT-IT, AT-LI, AT-SK, BE-LU, BE-NL, CH-DE, DE-DK, DE-FR, DE-LU, DE-NL, DK-SE, FI-NO, FI-SE, NO-SE

better economic conditions, there are no major effects that prevent them from making efficient use of their resources. Richer and economically growing border regions have fewer obstacles than the average. The main obstacles for maritime borders² are socio-economic disparities and cultural obstacles in terms of a lack of trust in people living on the other side of the border. Human and social capital and shared management of natural resources are important for socio-economic and territorial cohesion in both land and maritime borders.

Declining regions (GDP profile)

There are 22 border regions with a per capita GDP below the border regions average and a GDP decrease between 2008 and 2013. In particular, in maritime border regions under this category, socio-economic disparities and physical obstacles represent significant barriers to cross-border activities. The types of potential in both maritime and land regions relate to competitiveness (product innovation, cultural activities), market integration and to human capital. Furthermore, maritime declining border regions also have competitiveness potential that comes from industrial activity.

Highly populated border regions

There are eight highly-populated border regions³. Cultural obstacles predominate in highly populated maritime regions. Normative and institutional obstacles as well as socio-economic disparities are common to both land and maritime regions with high population density. The competitiveness potential in land border regions comes from cultural activities, while industrial activities are more important for maritime border regions. Land borders have a higher potential in market integration due to the employment rate differences.

Border regions with growing populations

There were 31 border regions that had population growth between 2008 and 2013⁴. Normative and institutional obstacles are relevant for the socio-economic and territorial cohesion of land border regions with growing populations. The situation is different for maritime regions where no common major obstacle is shared among the eight borders. Both types of borders share human and social capital potential, which is relevant for policy intervention. In addition, maritime regions have the potential related

² DE-DK, DE-SE, DK-NO, DK-SE, EE-FI

³ The population in border areas is higher than the average of the border regions. This category includes: BE-FR, BE-NL, DE-FR and DE-NL for the land border regions and BE-UK, DE-DK, DK-SE, FR-UK for the maritime border regions.

⁴ AT-CH, AT-CZ, AT-DE, AT-HU, AT-IT, AT-LI, AT-SK, BE-FR, BE-LU, BE-NL, CH-DE, CH-FR, CH-IT, CZ-SK, DE-LU, DE-SE, ES-FR, FI-NO, FR-IT, FR-LU, HU-SK, IE-UK and NO-SE for the land border regions and DK-NO, DK-SE, EE-FI, FI-SE, FR-IT, HR-IT, IE-UK and IT-MT for the maritime border regions.

to market integration and shared management of natural resources in common.

Border regions with decreasing population

Land and maritime border regions show cultural obstacles⁵. Both maritime and land borders have competitiveness potential. Moreover, there is human and social capital potential as well as a potential in market integration in land border regions. Maritime regions share potential related to human and social capital and shared management of natural resources. Policy intervention in social capital is relevant for both land and maritime border regions.

Border regions according to the date of EU membership

The 28 border regions between old Member States, i.e. founding EU countries or those joining before 2004, have fewer obstacles on average than the other border regions⁶. Growth potential comes from investments in industrial activities, labour market integration to harmonise differences in employment rates across borders and the presence of cities, which can be used in a cross-border network to develop and deliver integrated services.

There are 13 border regions between recent Member States that face mainly cultural obstacles⁷. The sub-set of land borders have both rivers and mountains as physical obstacles. All the borders share potential in competitiveness (related to product innovation). Some border regions have potential in delivering integrated urban services⁸ while others demonstrate potential related to market integration and human and social capital.

There are 21 border regions between recent and old Member States and non-Member States⁹ that share normative and institutional obstacles. Due to the variety within the category, border regions show different types of potential.

⁵ Nine border regions have decreasing populations: BG-RO, DE-DK, DE-FR, EE-LV, FI-SE, HR-HU, HU-RO, LT-LV, LT-PL for land border regions and the two maritime border areas, EE-LV and LV-SE.

⁶ AT-DE, AT-IT, BE-DE, BE-FR, BE-LU, BE-NL, DE-DK, DE-FR, DE-LU, DE-NL, ES-FR, ES-PT, FI-SE, FR-IT, FR-LU, and IE-UK for the land border regions. BE-UK, DE-DK, DE-SE, DK-SE, EL-IT, FI-SE, FR-IT, FR-UK, IE-UK and NL-UK for the maritime border regions.

⁷ BG-RO, CZ-PL, CZ-SK, EE-LV, HR-HU, HR-SI, HU-RO, HU-SI, HU-SK, LT-LV, LT-PL and PL-SK for land border regions and the unique maritime border area, EE-LV.

⁸ In particular, the borders having potential related to the presence of couples of cities across the border are BG-RO and CZ-PL.

⁹ AT-CH, AT-CZ, AT-HU, AT-LI, AT-SI, AT-SK, BG-EL, CH-DE, CH-FR, CH-IT, CZ-DE, DE-PL, FI-NO, IT-SI and NO-SE for land border regions and DK-NO, DK-PL, EE-FI, HR-IT, IT-MT and LV-SE for maritime border regions.

Opportunity to intervene in terms of policy relevance

Border regions are highly differentiated in terms of their needs, so each one requires a different mix of policy approaches. They may require intervention to improve the efficiency of fully using resources through specific measures on **governance**, (i.e. on 'soft' elements and investment, reinforcing integration and cooperation between communities). Alternatively, border regions may require new **investments** to increase the available, but insufficient, resources to achieve potential and promote economic, social and territorial cohesion. Some border regions may need **both types of intervention**.

A majority of border regions suffer from an inefficient use of the resources they already have, rather than from a lack of resources. Thus, to promote cohesion, border regions require **intervention in the governance of resources rather than new investment** to increase such endowments. In this regard, **CBC programmes can stimulate intervention on governance to unlock competitiveness potential for industrial and culture activities, as well as growth potential related to human and social capital**. In some territories, **the shared management of natural resources as well as integrated services in urban cross-border areas can be promoted**.

ZUSAMMENFASSUNG

Die Studie zeigt die Haupthemmnisse und Potenziale (Bedürfnisse) für Entwicklung und Wachstum in grenzübergreifenden Regionen auf. Die Bedürfnisse gehen aus einer Prüfung der Fachliteratur hervor, sowie aus ausgewählten Befragungen von Interessengruppen und einer Untersuchung von 57 Programmen der grenzübergreifenden Zusammenarbeit (GÜZ) für den Zeitraum 2014 - 2020.

Nach der Bedarfsermittlung analysiert die Studie die **Eignung** (*Ordnen sie sich in die GÜZ -Programme ein?*), **Erschwinglichkeit** (*Wie hoch wären die Kosten?*) und **Relevanz** (*Wie wichtig ist der Bedarf, um das Vertragsziel eines wirtschaftlichen, sozialen und territorialen Zusammenhalts zu erreichen?*) jedes identifizierten Hemmnisses und Potenzials für die GÜZ-Politik nach 2020.

Die Hemmnisse und Potenziale für die Grenzregionen wurden anhand von Indikatoren ermittelt. Diese Erhebung stützte sich auf eine Datenbank, die speziell für diese Studie entwickelt wurde und 25 aktuelle und harmonisierte Indikatoren umfasst, die auf Ebene der **Grenzregionen** aggregiert wurden und auf 2013 NUTS-3-Ebene verfügbar sind. Es gibt Informationen auf niedrigerer Gebietsebene, dem **Grenzgebiet**, das als eine 25 km breite Pufferzone auf beiden Seiten der Grenze definiert wurde.

Die Grenzregionen befinden sich an den Land- und Seegrenzen zwischen zwei Ländern, einschließlich EU-Mitgliedstaaten, Norwegen, Schweiz, Liechtenstein und Andorra. Die Studie identifiziert **62 Grenzregionen**, von denen 45 Land- und 17 Seegrenzregionen sind.

In die Datenbank können ebenfalls zukünftige Entscheidungen über Programme sowie vergleichende Analysen von Grenzregionen aufgenommen werden. Erstens gibt es Werte für jeden Indikator in jeder Grenzregion und eine Einstufung von Grenzregionen für jedes Hemmnis und jedes Potenzial. Und zweitens gewährt die Datenbank Einblick in jedes spezifische Grenzhemmnis und -potenzial. Die Datenbank kann zusätzlich auch zur Untersuchung der geographischen, demographischen, institutionellen und wirtschaftlichen Merkmale jeder Grenzregion eingesetzt werden.

Der methodische Ansatz ist jedoch begrenzt, da aktualisierte Indikatoren auf der richtigen Gebietsebene nicht immer verfügbar sind. Für eine verbesserte Quantifizierung der Bedürfnisse bietet die Studie zusätzliche Indikatoren an, die in Zusammenarbeit zwischen der EU und den Statistischen Ämtern der Mitgliedstaaten entwickelt werden sollten. Das Forschungsteam regt folgende Prioritäten an:

- Anzahl und Art der Straßen an den Grenzübergängen
- Verkehrsengepässe im öffentlichen Verkehr entlang der Grenzen
- Anzahl der grenzüberschreitenden Stellensuchen

- Lage städtischer Dienstleistungen
- Anzahl an grenzüberschreitenden Verträgen zwischen Institutionen

Des Weiteren empfiehlt die Studie eine regelmäßige Aktualisierung der Indikatoren in der Datenbank auf Basis von statistischen Quellen auf europäischer Ebene wie bspw. Eurobarometer, Eurostat und Espon.

Wesentliche Hemmnisse und Potenziale

Die wesentlichen Hemmnisse beziehen sich auf:

- **sozioökonomische Disparitäten** in wirtschaftlichen Strukturen und Verhaltensweisen;
- **physische Hemmnisse**, die den grenzüberschreitenden Zugang begrenzen;
- **kulturelle Hemmnisse**, die Sprachbarrieren, kulturelle Unterschiede und mangelndes Vertrauen in Menschen, die auf der anderen Seite der Grenze leben, umfassen;
- **normative und institutionelle Hemmnisse** aufgrund verschiedener Organisationen, Verfahren und Vorschriften.

Die wesentlichen Potenziale betreffen:

- regionale **Wettbewerbsfähigkeit** in Bezug auf Produktinnovation und industrielle und kulturelle Attraktivität;
- **Marktintegration**, einschließlich Arbeitsmarkt;
- **Human- und Sozialkapital**, das in den grenzübergreifenden Regionen verfügbar ist;
- integrierte Bereitstellung und Entwicklung von **öffentlichen Dienstleistungen in grenzübergreifenden Stadtgebieten**;
- **gemeinsame Bewirtschaftung natürlicher Ressourcen**.

Hemmnisse und Potenziale sind in vielen Wirtschaftssektoren und -bereichen anzutreffen, die für staatliche Interventionen im Form von GÜZ in Frage kommen, wie bspw. Infrastruktur (physische Barrieren), Verkehrswesen und Arbeitsmarkt (Marktintegration), Innovation und Geschäftstätigkeit (Wettbewerbsfähigkeit), Bereitstellung von Dienstleistungen in Stadtgebieten (städtische grenzüberschreitende Dienstleistungen), Bildung, Ausbildung und soziale Tätigkeiten (Human- und Sozialkapital) und natürliche Ressourcen (Grünanlagen, Naturgebiete und Schutzgebiete). Bei den normativen und institutionellen Hemmnissen handelt es sich um Querschnittsthemen, die sich auf die Bereiche Gesundheit, Verkehrswesen und Umweltrisikomanagement beziehen.

Hemmnisse und Potenziale unterscheiden sich auch durch ihre Erschwinglichkeit im Rahmen der Interreg-Programme. Die Erschwinglichkeit reicht von einem niedrigen Investitionsbedarf in neue Infrastrukturen, um physische Hemmnisse anzugehen, bis hin zu einem hohen Investitionsbedarf für immaterielle Vermögenswerte, z. B. kulturelle Hindernisse oder Human- und Sozialkapital. Die Mehrheit der Bedürfnisse ist jedoch äußerst erschwinglich für GÜZ-Programme.

Hemmnisse und Potenziale in Grenzregionen sind ein Signal für öffentliche oder private Interventionen. Die alleinige Identifizierung dieser Hemmnisse und Potenziale ist jedoch nicht ausreichend. Ein Angehen der Hemmnisse und Ausschöpfen von Potenzialen würde in einigen Fällen keine erheblichen Auswirkungen auf die regionale Wirtschaft haben. So erfordert zum Beispiel das Ausschöpfen von Wachstumspotenzialen durch die Schaffung neuen Wissens die Kapazität, dieses Wissen auch in marktfähige Produkte umzusetzen, die in dieser Grenzregion nicht unbedingt vorhanden sind. Aus diesem Grund hat die Studie zur Identifizierung des Wirkungsgrads von EU-Interventionen in Grenzregionen über GÜZ ebenfalls die politische Relevanz in Bezug auf die Vertragsziele des wirtschaftlichen, sozialen und territorialen Zusammenhalts analysiert. Auf Grundlage der von dem Forschungsteam gesammelten Daten wird aufgezeigt, dass **die Relevanz für rechtliche und normative Hemmnisse sowie für Hemmnisse, die durch kulturelle und sprachliche Barrieren bedingt sind, in der Regel hoch ist.** Durch deren Überwindung anhand von spezifischen Maßnahmen sollten die Regionen bei großen Hemmnissen in der Lage sein, ihr Potenzial effizienter auszuschöpfen und eine deutliche Auswirkung auf den wirtschaftlichen, sozialen und territorialen Zusammenhalt zu erzielen. Interventionen zur Behebung von physischen Hemmnissen und sozioökonomischen Disparitäten sind normalerweise weniger relevant.

Die relevantesten Potenziale sind jedoch im Bereich Wettbewerbsfähigkeit (für Produktinnovationen und die Entwicklung industrieller und kultureller Tätigkeiten) und **Sozial- und Humankapital** (Bildung, Ausbildung und Förderung des sozialen Zusammenhalts) zu finden. Das Ausschöpfen anderer Potenziale wäre in der Regel nicht sehr relevant für den sozioökonomischen und territorialen Zusammenhalt.

Erhebung von Hemmnissen und Potenzialen in den Grenzregionen

Die Studie identifiziert Grenzregionen-Cluster, die auf ihrer wirtschaftlichen Leistungsfähigkeit (Bruttoinlandsprodukt BIP und BIP-Wachstum), ihren demographischen Merkmalen (Bevölkerungsdichte, Bevölkerungszahl und Bevölkerungswachstum) sowie der EU-Mitgliedschaft beruhen.

Wachstumsregionen (BIP-Profil)

Die wachsenden Landgrenzregionen mit einem hohen BIP befinden sich in Nord- und Westeuropa¹⁰. In 17 dieser Regionen mit vergleichsweise besseren wirtschaftlichen Voraussetzungen existieren keine wesentlichen negativen Einflüsse, die eine effiziente Nutzung ihrer Ressourcen verhindern. Reichere und wirtschaftlich wachsende Grenzregionen sehen sich weniger Hemmnissen ausgesetzt, als dies beim Durchschnitt der Fall ist. Zu den wesentlichen Hemmnissen an Seegrenzen¹¹ zählen die sozioökonomischen Disparitäten und kulturellen Hindernisse, die sich in einem mangelnden Vertrauen in Menschen äußern, die auf der anderen Grenzseite leben. Human- und Sozialkapital sowie die gemeinsame Bewirtschaftung natürlicher Ressourcen sind wichtig für den sozioökonomischen und territorialen Zusammenhalt an Land- und Seegrenzen gleichermaßen.

Strukturschwache Regionen (BIP-Profil)

22 Grenzregionen verfügen über ein BIP, das unter dem Durchschnitt liegt und verzeichnen einen BIP-Rückgang zwischen 2008 und 2013. Insbesondere in Seegrenzregionen dieser Kategorie bilden sozioökonomische Disparitäten und physische Hindernisse deutliche Barrieren für grenzübergreifende Tätigkeiten. Die Potenziale in See- und Landregionen sind in Beziehung mit der Wettbewerbsfähigkeit (Produktinnovation, kulturelle Tätigkeiten), der Marktintegration und dem Humankapital zu setzen. Zudem verfügen strukturschwache Seegrenzregionen über Wettbewerbspotenziale, die sich aus industriellen Tätigkeiten ableiten.

Bevölkerungsreiche Grenzregionen

8 der Grenzregionen sind stark bevölkert¹². In bevölkerungsreichen Seegrenzregionen überwiegen die kulturellen Hemmnisse. Normative und institutionelle Hemmnisse sowie sozioökonomische Disparitäten sind sowohl Land- als auch Seegrenzregionen mit hoher Bevölkerungsdichte gemeinsam. Das Wettbewerbspotenzial in Landgrenzregionen ergibt sich aus den kulturellen Tätigkeiten, während für Seegrenzregionen die Industrie weitaus wichtiger ist. Landgrenzen verfügen aufgrund der Unterschiede in der Beschäftigungsquote über ein höheres Potenzial der Marktintegration.

¹⁰ Grenzregionen mit einem höheren BIP als der Durchschnitt der Grenzregionen. Diese Kategorie umfasst: AT-CH, AT-DE, AT-HU, AT-IT, AT-LI, AT-SK, BE-LU, BE-NL, CH-DE, DE-DK, DE-FR, DE-LU, DE-NL, DK-SE, FI-NO, FI-SE, NO-SE

¹¹ DE-DK, DE-SE, DK-NO, DK-SE, EE-FI

¹² Die Bevölkerungsdichte im Grenzgebiet ist höher als der Durchschnitt in den Grenzregionen. Diese Kategorie umfasst: BE-FR, BE-NL, DE-FR und DE-NL für die Landgrenzregionen und BE-UK, DE-DK, DK-SE, FR-UK für die Seegrenzregionen.

Grenzregionen mit Bevölkerungswachstum

31 Grenzregionen verzeichnen zwischen 2008 und 2013 ein Bevölkerungswachstum¹³. Normative und institutionelle Hemmnisse sind relevant für den sozioökonomischen und territorialen Zusammenhalt von Landgrenzregionen mit Bevölkerungswachstum. Dies gilt jedoch nicht für Seegrenzregionen, die an ihren acht Grenzen keine gemeinsamen wesentlichen Hemmnisse aufweisen. Beide Grenztypen verfügen über ein gemeinsames Potenzial im Bereich Human- und Sozialkapital, das für politische Interventionen relevant ist. Des Weiteren haben Seegrenzregionen Potenziale im Hinblick auf die Marktintegration und die gemeinsame Bewirtschaftung natürlicher Ressourcen gemein.

Grenzregionen mit einem Bevölkerungsrückgang

Land- und Seegrenzregionen zeigen kulturelle Hemmnisse¹⁴. Sowohl See- als auch Landgrenzregionen verfügen über Wettbewerbspotenziale. Ferner besteht in Landgrenzregionen Potenzial für das Human- und Sozialkapital sowie für die Marktintegration. Seegrenzregionen haben gemeinsame Potenziale im Hinblick auf das Human- und Sozialkapital und die gemeinsame Bewirtschaftung natürlicher Ressourcen. Politische Interventionen in das Sozialkapital sind relevant für beide Arten von Grenzregionen.

Grenzregionen entsprechend ihres Beitrittsdatums in die EU-Mitgliedschaft

28 Grenzregionen zwischen alt eingesessenen Mitgliedstaaten, d. h. EU-Gründerstaaten, und jenen, die vor 2004 beigetreten sind, haben durchschnittlich weniger Hemmnisse als die anderen Grenzregionen¹⁵. Wachstumspotenziale ergeben sich aus Investitionen in industrielle Tätigkeiten, Arbeitsmarktintegration zur Harmonisierung von grenzüberschreitenden Unterschieden in der Beschäftigungsquote und der Existenz von Städten, die als Knotenpunkte in grenzübergreifenden Netzwerken zur Entwicklung und Bereitstellung integrierter Dienstleistungen dienen können.

13 Grenzregionen unter den neu beigetretenen Mitgliedstaaten sehen sich kulturellen Hemmnissen ausgesetzt¹⁶. Die Untergruppe der Landgrenzregionen sehen sich mit physischen Hemmnissen konfrontiert, seien es Flüsse oder Berge. Alle Grenzregionen verfügen über gemeinsame Wettbewerbspotenziale (in

¹³ AT-CH, AT-CZ, AT-DE, AT-HU, AT-IT, AT-LI, AT-SK, BE-FR, BE-LU, BE-NL, CH-DE, CH-FR, CH-IT, CZ-SK, DE-LU, DE-SE, ES-FR, FI-NO, FR-IT, FR-LU, HU-SK, IE-UK und NO-SE für die Landgrenzregionen DK-NO, DK-SE, EE-FI, FI-SE, FR-IT, HR-IT, IE-UK und IT-MT für die Seegrenzregionen.

¹⁴ Neun Grenzregionen haben eine rückläufige Bevölkerung: BG-RO, DE-DK, DE-FR, EE-LV, FI-SE, HR-HU, HU-RO, LT-LV, LT-PL für die Landgrenzregionen und die beiden Seegrenzregionen EE-LV und LV-SE.

¹⁵ AT-DE, AT-IT, BE-DE, BE-FR, BE-LU, BE-NL, DE-DK, DE-FR, DE-LU, DE-NL, ES-FR, ES-PT, FI-SE, FR-IT, FR-LU und IE-UK für die Landgrenzregionen. BE-UK, DE-DK, DE-SE, DK-SE, EL-IT, FI-SE, FR-IT, FR-UK, IE-UK und NL-UK für die Seegrenzregionen.

¹⁶ BG-RO, CZ-PL, CZ-SK, EE-LV, HR-HU, HR-SI, HU-RO, HU-SI, HU-SK, LT-LV, LT-PL und PL-SK für die Landgrenzregionen und die einzige Seegrenze EE-LV.

Verbindung mit Produktinnovation). Einige Grenzregionen verfügen über Potenziale zur Bereitstellung von integrierten städtischen Dienstleistungen¹⁷, andere hingegen zeigen Potenziale zur Marktintegration und im Bereich Human- und Sozialkapital.

21 Grenzregionen zwischen neu beigetretenen und alteingesessenen Mitgliedstaaten und Nicht-Mitgliedstaaten¹⁸ haben gemeinsame normative und institutionelle Hemmnisse. Angesichts der Vielfalt innerhalb der Kategorie zeigen die verschiedenen Grenzregionen auch unterschiedliche Potenziale.

Möglichkeiten für Interventionen nach Maßgabe der politischen Relevanz

Grenzregionen unterscheiden sich deutlich hinsichtlich ihrer unterschiedlichen Bedürfnisse und aus diesem Grund ist für jede Region eine andere Kombination aus verschiedenen politischen Ansätzen erforderlich. Sie können beispielsweise Interventionen zur Effizienzsteigerung bei der umfassenden Ressourcennutzung durch bestimmte **Governance**-Maßnahmen erfordern (z. B. „harte“ und „weiche“ Investitionen, Stärkung der Integration und Kooperation zwischen den Gemeinschaften). Alternativ können einige Grenzregionen neue **Investitionen** zur Steigerung der verfügbaren (jedoch unzureichenden) Ressourcen erfordern, um Potenziale auszuschöpfen und den wirtschaftlichen, sozialen und territorialen Zusammenhalt zu fördern. Einige Grenzregionen können auch **beide Interventionsformen** benötigen.

Governance-Interventionen stimulieren, um Wettbewerbspotenziale für industrielle und kulturelle Tätigkeiten sowie Wachstumspotenziale für das Human- und Sozialkapital auszuschöpfen. In einigen Gebieten können die gemeinsame Bewirtschaftung natürlicher Ressourcen sowie integrierte Dienstleistungen in grenzübergreifenden Stadtgebieten gefördert werden.

¹⁷ Zu den Grenzregionen mit Potenzialen aus bestehenden grenzübergreifenden Städtepaaren zählen insbesondere BG-RO und CZ-PL.

¹⁸ AT-CH, AT-CZ, AT-HU, AT-LI, AT-SI, AT-SK, BG-EL, CH-DE, CH-FR, CH-IT, CZ-DE, DE-PL, FI-NO, IT-SI und NO-SE für die Landgrenzregionen und DK-NO, DK-PL, EE-FI, HR-IT, IT-MT sowie LV-SE für die Seegrenzregionen.

RÉSUMÉ ANALYTIQUE

L'étude s'est fixée comme objectif d'identifier les principaux obstacles et potentiels (les besoins) de croissance et de développement dans les régions transfrontalières. Ces besoins ont été mis en évidence à travers une revue de la littérature existante, des entretiens auprès d'acteurs privilégiés de la coopération territoriale européenne ainsi que l'analyse de 57 programmes européens de coopération transfrontalière 2014-2020.

Après avoir identifié les besoins, l'étude analyse leur **spécificité** (cadrent-ils bien avec les objectifs des programmes de coopération transfrontalière ?), leur **accessibilité** en termes financiers (quels sont leur coûts ?) et leur **pertinence** au regard des politiques de coopération au-delà de l'horizon 2020 (sont-ils déterminants pour atteindre les objectifs de la cohésion économique, sociale et territoriale ?).

Les obstacles et potentiels ont été cartographiés pour chacune des régions transfrontalières. Cette cartographie repose sur une banque de données qui identifie 25 indicateurs transfrontaliers agrégés définis à partir d'informations disponibles à l'échelle territoriale NUTS3. La banque de données met en outre à disposition une information à un niveau territorial plus fin, l'**espace transfrontalier**, défini comme une zone de 25 kilomètres de large, de part et d'autre de la frontière.

Les régions transfrontalières sont situées sur les frontières terrestres et maritimes de deux pays voisins, incluant les états membres de l'Union ainsi que la Norvège, la Suisse, le Liechtenstein et Andorre. Au total, l'étude distingue 62 régions transfrontalières, dont 45 terrestres et 17 maritimes.

La banque de données peut aider à la définition des futurs programmes et constitue également une base pour l'analyse comparative des régions transfrontalières. En premier lieu, elle met à disposition des données pour chacun des indicateurs disponibles et fournit un classement des régions transfrontalières pour chaque obstacle et potentiel identifié. En second, elle donne des informations utiles sur les obstacles et potentiels. Enfin, elle peut être utilisée pour mieux caractériser les régions transfrontalières d'un point de vue géographique, démographique, institutionnel et économique.

L'approche méthodologique suivie par l'étude présente des limites, en particulier la disponibilité au niveau territorial d'indicateurs mis à jour n'est pas toujours garantie. En vue d'améliorer la quantification des besoins, l'étude propose le développement d'indicateurs supplémentaires en collaboration avec les instituts de statistique nationaux et européens. Les indicateurs à développer en priorité sont :

- Nombre et type de routes traversant la frontière ;
- Goulots d'étranglement dans les transports publics, le long de la ligne frontalière ;

- Nombre de recherches transfrontalières d'offre d'emplois ;
- Localisation des services publics urbains ;
- Nombre d'accords transfrontaliers entre institutions.

De plus, l'étude recommande une mise à jour régulière des indicateurs de la banque de données, tenant compte des sources statistiques au niveau européen, telles que l'Eurobarometer, Eurostat ou encore le programme Espon.

Principaux obstacles et potentiels

Les principaux obstacles entre pays frontaliers sont :

- Les **disparités socio-économiques** en termes de structures économiques et de comportements ;
- Les **obstacles physiques** qui limitent l'accès le long des frontières ;
- Les **obstacles culturels**, qui incluent les barrières linguistiques, les différences culturelles et le manque de confiance entre personnes vivants de part et d'autre de la frontière ;
- Les **obstacles institutionnels et normatifs** dus à la différence dans l'organisation, les procédures et les règles en vigueur.

Les principaux potentiels transfrontaliers sont :

- La **compétitivité régionale**, liée à l'innovation productive et l'attractivité industrielle et culturelle,
- L'**intégration des marchés**, y compris le marché du travail,
- La **disponibilité du capital humain et social** dans les régions transfrontalières,
- La fourniture et le développement intégrés des **services publics dans les aires urbaines transfrontalières**,
- La **gestion partagée des ressources naturelles**.

Les **obstacles et potentiels** couvrent de nombreux secteurs économiques d'intérêt pour la coopération transfrontalière, tels que les infrastructures (barrières physiques), les transports et le marché du travail (intégration des marchés), l'innovation et les activités économiques (compétitivité), l'offre de services dans les zones urbaines (services urbains transfrontaliers), l'éducation, la formation et les activités de nature sociale (capital humain et social) et les ressources naturelles (espaces verts naturels et espaces protégés). Les obstacles normatifs et

institutionnels sont transversaux et font référence en particulier aux secteurs de la santé, des transports et de la gestion des risques environnementaux.

Les **obstacles et potentiels diffèrent également en termes d'acceptabilité (leur coût) pour les programmes Interreg**. Celle-ci va de basse – pour les investissements dans de nouvelles infrastructures qui permettent d'abattre les obstacles physiques – à élevée dans le cas d'actifs intangibles tels que ceux liés aux obstacles culturels ou au capital social et humain.

La présence d'obstacles et de potentiels dans une région frontalière est le signe d'une opportunité d'intervention publique. Toutefois, l'identification en soi des obstacles et potentiels n'est pas suffisante. En effet, la réduction des obstacles où l'exploitation d'un potentiel pourraient ne pas avoir toujours l'impact escompté sur l'économie régionale. Par exemple, exploiter un potentiel lié à la connaissance pure nécessite une capacité à transformer cette connaissance en produit que l'on peut écouler sur un marché, qui n'est pas nécessairement présente dans toute les régions transfrontalières. De fait, pour rendre compte de l'efficacité des programmes transfrontaliers, l'étude a également analysée la pertinence dans l'intervention publique au regard des objectifs fixés par le Traité en termes de cohésion économique, sociale et territoriale. Sur la base des données collectées par l'étude, la pertinence est à considérer **comme étant généralement élevée dans le cas de politiques visant à réduire les obstacles légaux et normatifs, ainsi que ceux liés aux barrières linguistiques et culturelles**. Intervenir en priorité sur ces obstacles, lorsqu'ils sont importants, devraient permettre aux régions de réaliser leurs potentiels de manière plus efficace en produisant des impacts significatifs sur la cohésion économique, sociale et territoriale. Les interventions visant les obstacles physiques et les disparités socio-économiques sont généralement moins efficaces.

Les potentiels les plus pertinents sont liés à la compétitivité (l'innovation produit et le développement des activités industrielles et culturelles) **et au capital social et humain** (l'éducation, la formation et la cohésion sociale). L'intervention sur les autres potentiels n'est généralement pas significative en termes de cohésion socio-économique et territoriale.

Cartographie des obstacles et des potentiels dans les régions transfrontalières

L'étude a identifié des groupes de régions au regard de leur performance économique (PNB par habitant et croissance du PNB), de leurs caractéristiques démographiques (densité, taille de la population, croissance démographique) et de leur profile d'appartenance à l'Union.

Les régions en croissance (profile PNB)

Les 17 régions transfrontalières avec un PNB par habitant élevé et qui sont en croissance sont principalement localisées dans le nord et l'ouest de l'Europe¹⁹. Ces régions ne présentent pas d'obstacle particulier à l'exploitation optimale de leurs ressources ; elles ont de fait en moyenne moins d'obstacles que les autres régions transfrontalières en Europe. Dans les régions maritimes, les obstacles qui peuvent être notés, lorsqu'ils existent, sont liés aux disparités socio-économiques et culturelles, ainsi qu'en termes de confiance exprimée sur les personnes vivant de l'autre côté de la frontière²⁰. Notons également que pour cette catégorie de régions, le capital social et humain, ainsi que les ressources naturelles communes, sont des facteurs importants pour la cohésion socio-économique et territoriale, qu'il s'agisse de frontières terrestres ou maritimes.

Régions en déclin (profile PNB)

On recense 22 régions avec un PNB par habitant en dessous de la moyenne et qui enregistrent en même temps une décroissance de leur PNB entre 2008 et 2013. En particulier, dans les régions transfrontalières maritimes appartenant à ce groupe les disparités socio-économiques et les obstacles physiques représentent des barrières significatives au développement des activités. Les potentiels sont liés à la compétitivité (innovation produit et activités culturelles), à l'intégration des marchés et au capital humain. Notons, de plus, que les régions maritimes en déclin ont un potentiel de compétitivité dérivant du développement d'activités industrielles.

Régions transfrontalières peuplées

Il y a 8 régions transfrontalières caractérisées par une forte population²¹. Les obstacles culturels prédominent dans les régions maritimes de cette catégorie. Les obstacles normatifs et institutionnels aussi bien que les disparités socio-économiques sont communs aux régions transfrontalières terrestres et maritimes densément habitées. Le potentiel de compétitivité des régions transfrontalières terrestres peuplées provient des activités culturelles, tandis que l'aspect industriel est plus important dans les régions maritimes. Notons, enfin, que les frontières terrestres ont un potentiel lié à l'intégration des marchés élevé, dû à une différence importante dans les taux d'emplois de part et d'autre de la ligne frontalière.

¹⁹ Régions avec PNB par tête supérieur à la moyenne des régions transfrontalières : AT-CH, AT-DE, AT-HU, AT-IT, AT-LI, AT-SK, BE-LU, BE-NL, CH-DE, DE-DK, DE-FR, DE-LU, DE-NL, DK-SE, FI-NO, FI-SE, NO-SE.

²⁰ DE-DK, DE-SE, DK-NO, DK-SE, EE-FI.

²¹ Population en moyenne plus élevée que dans les autres régions transfrontalières : BE-FR, BE-NL, DE-FR et DE-NL pour les frontières terrestres et BE-UK, DE-DK, DK-SE, FR-UK pour les frontières maritimes.

Les régions transfrontalières avec population croissante

Près de 31 régions transfrontalières ont connu une croissance de leur population entre 2008 et 2013²². Les interventions sur les obstacles normatifs et institutionnels sont particulièrement pertinentes pour la cohésion socio-économique et territoriale des frontières terrestres de ce groupe de régions. La situation est différente pour les régions maritimes, qui connaissent en termes d'obstacles une situation contrastée. Les deux types de frontières partagent en commun la pertinence des interventions sur le capital humain et social. De plus, les régions maritimes avec une population croissante ont en commun les potentiels liés à l'intégration des marchés et à la gestion partagée de leurs ressources naturelles.

Les régions transfrontalières avec population décroissante

Ces régions transfrontalières présentent principalement des obstacles culturels²³ et ont un fort potentiel en termes de compétitivité. Les frontières terrestres ont en plus un potentiel de développement de leur capital social et humain ainsi que dans l'intégration des marchés ; tandis que les régions maritimes, outre leur capital social et humain, présentent également un potentiel dans la gestion partagée de leurs ressources naturelles. Les interventions politiques dans le capital social sont pertinentes pour les deux types de régions, qu'elles soient terrestres ou maritimes.

Les régions transfrontalières selon leur date d'adhésion

Les 28 régions transfrontalières entre Etats membres fondateurs, ou ayant accédés à l'Union Européenne avant 2004, ont en moyenne moins d'obstacles que les autres régions transfrontalières²⁴. Les potentiels de croissance sont à chercher dans les activités industrielles, l'intégration dans le marché du travail, visant à harmoniser les taux d'emplois des deux côtés de la frontière ainsi que dans la présence de villes, qui sont à considérer comme des nœuds importants dans les réseaux transfrontaliers pour développer l'offre de services intégrés de part et d'autre.

²² AT-CH, AT-CZ, AT-DE, AT-HU, AT-IT, AT-LI, AT-SK, BE-FR, BE-LU, BE-NL, CH-DE, CH-FR, CH-IT, CZ-SK, DE-LU, DE-SE, ES-FR, FI-NO, FR-IT, FR-LU, HU-SK, IE-UK et NO-SE pour les frontières terrestres et DK-NO, DK-SE, EE-FI, FI-SE, FR-IT, HR-IT, IE-UK et IT-MT pour les frontières maritimes.

²³ 11 régions transfrontalières ont une population décroissante : BG-RO, DE-DK, DE-FR, EE-LV, FI-SE, HR-HU, HU-RO, LT-LV, LT-PL pour les frontières terrestres et 2 pour les frontières maritimes EE-LV et LV-SE.

²⁴ AT-DE, AT-IT, BE-DE, BE-FR, BE-LU, BE-NL, DE-DK, DE-FR, DE-LU, DE-NL, ES-FR, ES-PT, FI-SE, FR-IT, FR-LU, et IE-UK pour les frontières terrestres. BE-UK, DE-DK, DE-SE, DK-SE, EL-IT, FI-SE, FR-IT, FR-UK, IE-UK and NL-UK pour les frontières maritimes.

Les 13 régions frontalières entre Etats membre de récente adhésion font face à des obstacles culturels²⁵ ; tandis que les frontières terrestres ont également des obstacles physiques spécifiques (rivières ou montagnes). Toutes les frontières ont en commun des potentiels en termes de compétitivité (liée à l'innovation produit). Certaines régions présentent des potentiels dans la fourniture de services urbains intégrés²⁶, tandis que d'autres démontrent des potentiels dans l'intégration des marchés et le développement du capital social et humain.

Il y a 21 régions transfrontalières entre Etats d'ancienne et de récente adhésion, ou avec des Etats non-membres²⁷, qui partagent des obstacles normatifs et institutionnels. A noter la variété des situations en termes de potentiels des régions appartenant à cette catégorie.

Opportunité à intervenir en termes de pertinence politique

Les régions transfrontalières sont très différenciées en matière de besoins, de sorte que chacune requiert un mix de politiques spécifiques. Elles peuvent ainsi justifier des interventions pour améliorer l'usage de leurs ressources à travers l'adoption de mesures de gouvernance (interventions et investissements 'soft', renforcement de la capacité de coopération et d'intégration entre communautés). De manière alternative, les régions transfrontalières pourraient exiger de nouveaux investissements pour accroître la disponibilité des ressources déjà disponibles (mais insuffisantes), de manière à exploiter pleinement les potentiels et promouvoir la cohésion économique, sociale et territoriale. Notons que certaines régions transfrontalières pourraient avoir besoin de ces deux types d'intervention à la fois.

Une majorité des régions transfrontalières souffre de l'usage insuffisant des ressources dont elles disposent déjà, plutôt que d'une carence de ces mêmes ressources. De fait, pour promouvoir la cohésion, les régions transfrontalières ont besoin avant tout d'interventions dans la gouvernance plutôt que de nouveaux investissements permettant d'accroître les dotations initiales. A cet égard, les programmes de coopération transfrontalière peuvent stimuler les interventions de gouvernance pour libérer les potentiels de compétitivité des activités industrielles et culturelles et les potentiels de croissance liés au capital humain et social. Dans certains territoires, il est également important de promouvoir la gestion en commun des ressources naturelles et la fourniture des services intégrés dans les aires urbaines transfrontalières.

²⁵ BG-RO, CZ-PL, CZ-SK, EE-LV, HR-HU, HR-SI, HU-RO, HU-SI, HU-SK, LT-LV, LT-PL et PL-SK pour les frontières terrestres et pour l'unique frontière maritime EE-LV.

²⁶ En particulier, les frontières ayant un fort potentiel du à la présence de couples de villes de part et d'autre de la frontière sont BG-RO et CZ-PL.

²⁷ AT-CH, AT-CZ, AT-HU, AT-LI, AT-SI, AT-SK, BG-EL, CH-DE, CH-FR, CH-IT, CZ-DE, DE-PL, FI-NO, IT-SI et NO-SE pour les frontières terrestres et DK-NO, DK-PL, EE-FI, HR-IT, IT-MT et LV-SE pour les frontières maritimes.

INTRODUCTION

Borders between Member States have been created by politics and history. From an analytical point of view, borders can be considered as 'discontinuities' between two territories. These discontinuities can be spatial (difficult access), physical (rivers, mountains, seas), cultural, linguistic (different languages), demographic, social and economic. They differ in intensity and type, within and between Member States and change over time as well. For border policies, these discontinuities become barriers or obstacles, reducing the opportunities for cooperation between cross-border regions and players and hindering the use of resources for development. Barriers at cross-border level lead to untapped potential, so growth and development are sub-optimal. With EU cohesion policy, obstacles can be overcome and potential can be achieved, contributing to harmonious development in EU regions.

The objective of the study is to **collect solid evidence to assess obstacles and untapped growth potential – the needs to be addressed by Interreg cross-border cooperation programmes**. The framework of this study is provided by Article 174 of the TFEU, which states that 'In order to promote its overall harmonious development, the Union shall develop and pursue its actions leading to the strengthening of its economic, social and territorial cohesion'.

Existing EU references mainly focus on 'administrative barriers,' which hinder development dynamics and limit opportunities for cooperation across borders. However, these references fail to provide a complete picture of obstacles and potential in border regions in all 28 Member States, nor do they provide quantitative evidence for the intensity of needs and policy impact in addressing needs at cross-border level.

Within the scope of this study, defining what constitutes a need for a border region and how to quantify it requires:

- a complete overview of obstacles and potential, based on qualitative and quantitative evidence;
- taking into account needs that fall under the objectives of EU cohesion policy and territorial agenda in a CBC context;
- highlighting obstacles and potentials clearly linked with growth and development at cross-border level;
- collecting territorial level indicators across the 28 Member States.

The report is structured as follows:

- Section 1 explains the methodology used to map and quantify the needs at border region level;

- Section 2 lists needs in a CBC framework;
- Section 3 illustrates the main indicators to measure the needs;
- Section 4 uses maps and figures of border regions to illustrate the needs;
- Section 5 identifies the most significant growth potential and prioritises needs in terms of their policy relevance;
- Section 6 contains a proposed and additional set of indicators – not yet quantified.

The Annexes complete the information in the report:

- Annex 1: List of border regions by characteristics
- Annex 2: Tables and maps illustrating findings of section 4
- Annex 3: Additional graphic maps and visual representations of section 5
- Annex 4: Methodology of section 5
- Annex 5: Proposal for new indicators
- Annex 6: List of stakeholders involved in the study.

1. METHODOLOGICAL APPROACH

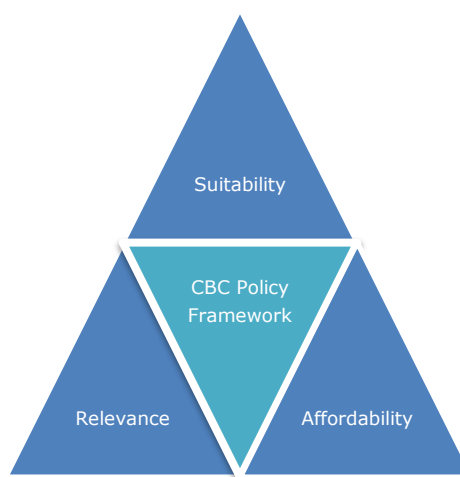
Based on the Terms of Reference, the study identified four specific objectives:

- mapping development needs in border regions;
- weighting and prioritising these needs in a cross-border policy framework;
- compiling an inventory of statistical data to quantify and represent the needs;
- making conclusions and recommendations on priorities for intervention in the next programming period.

To address these objectives, the study adopted an empirical approach, combining different sources of information from experts, programmes and references in the literature, as well as econometric analysis.

The **first step**, which was mapping the development needs (obstacles and potentials) in border regions, was a review of the literature, including recent publications from DG Regio, analysing 57 cooperation programmes (CBC 2014-2020), followed by a survey of 18 experts.

Not all the 37 'basic' needs identified in the previous step fit well with the CBC policy framework. Therefore, in **a second step**, the needs were weighted based on 'suitability', 'affordability' and 'relevance'. The most important needs are the ones most suitable in a CBC framework; affordable and with clear policy relevance.



The **third step** was creating an indicator database with quantitative information on an excel spreadsheet (see chapter 3). The database covers border regions, and the needs in 62 internal border regions, which were inventoried in step 1, with quantitative values both at border region and NUTS3 levels.

In a **fourth step**, results from the mapping and the indicators were subjected to in-depth econometric analysis to highlight potential that can promote cross-border cooperation (**chapter 5**).

In a **fifth step**, carried out in parallel with the previous one, the research team identified new indicators and sources of information not yet available, to better quantify border region needs and provide additional evidence for policy intervention after 2020 (**chapter 6**).

As a result, cross-border regional profiles (**chapter 4**) and recommendations on prioritising investments in the next programming period were provided (**chapter 5**). Maps and graphs are used extensively to illustrate the results of this study.

In this study, a **border region** covers territories having land and maritime borders between two Member States, Norway, Switzerland, Liechtenstein and Andorra. Maritime borders and land borders are separated in the analysis. A land border is marked out by a border line, while the coastlines of a region demarcate its maritime border.

For statistical reasons, indicators related to border regions are based on the NUTS3 classification. This study covers 62 border regions and their related NUTS3 territories.

As the intensity of cooperation is supposed to decrease with the distance from the border, specific **border areas** have also been defined in the course of the study. Border areas cover a 25 km buffer zone on both sides of the border. A set of additional indicators, defined at border area level, have been built-up using a GIS. These indicators mainly relate to population, urban areas, NATURA 2000 sites and physical obstacles such as mountains and rivers.

The methodology has limits. Needs have been identified based on existing knowledge. Any definition of obstacle and potential is also a matter of interpretation, and perceptions change over time. Quantifying the needs, through specific indicators, can be challenging when the need covers different policies, fields or sectors. Furthermore, the choice of indicators depends on available data, which are often lacking at NUTS3 and border area levels.

2. BORDER REGION NEEDS

In a first step, the research team identified 37 different 'basic' needs, obstacles and potentials, related to development and growth in a EU cohesion policy context. This list was arranged into broad categories, i.e. the needs with similarities were grouped, then narrowed through a weighting procedure based on three criteria: suitability, affordability and relevance.

- **Suitability** identifies those obstacles and growth potentials that fall under the scope of Cross-Border Cooperation policy;
- **Affordability** defines the financial effort requested to develop a policy addressing the specific obstacles and growth potentials;
- **Relevance** refers to the strategic role played by obstacles and growth potentials in achieving economic growth and social cohesion.

The weighting helps identify the general obstacles and potentials with clear cross-border policy suitability, as well as provides an estimation of their affordability, considering the expected financial allocation to CBC programmes, and an estimation of their relevance for social cohesion and economic growth.

Table 1 below reports the suitable needs and their level of affordability (ranking from low and medium to high) and their relevance in stimulating growth, estimated based on specific indicators (ranking from low, medium to high and case-by-case basis). The opportunity of addressing the needs (their relevance) must be evaluated considering the specific situation of each border region. More specific regional profiles are provided in section 4 and 5.

Table 1 - Weighting criteria: suitability, affordability and relevance of needs

	Suitability	Affordability	Relevance
Obstacles	Socio-economic disparities	Medium	Low
	Physical obstacles	Low for interventions on infrastructure, Medium / high for harmonisation of existing services (e.g. tariffs, time table)	Medium
	Cultural obstacles	High	High
	Normative and institutional obstacles	High	High
Potentials	Competitiveness potential	Medium	Low/Medium/high*
	Market integration potential	Low for intervention related to the infrastructure potential accessibility, medium for labour market integration	Low
	Social and human capital	High	High
	Potential of integrated services for cross-border functional urban areas	Low for intervention related to urban infrastructure and equipment, medium-high for intervention on existing services	case-by-case**
	Potential from share management of natural resources	High	case-by-case***

Legend:

Suitability identifies the obstacles and types of potential that fall under the competence of cross-border cohesion policies (consistence with Article 174 of the TFEU and Articles 3 to 6 of the TFEU that define EU policy competence; Territorial agenda of the European Union 2020)

Affordability: identifies the financial effort (magnitude) required to develop a policy on specific obstacles and growth potential. High=high affordability (low-medium costs of intervention, e.g training, design and planning, networking, communication and dissemination); Medium = medium affordability' (for Interreg programmes with medium-high costs of intervention, e.g. support to business, R&D projects, small

investments); Low= Low affordability (for Interreg programmes with a high-very high cost of intervention, e.g. linear infrastructures in transport, water and energy sectors).

Relevance of obstacles identifies the number types of growth potential hampered by each obstacle in their exploitation to achieve social, economic and territorial cohesion. Low = low number of types of growth potential. Medium = medium number of types of growth potential. High = high number of types of growth potential;

Relevance of types of potential identifies economic growth and social cohesion generated by each types of potential. Low = modest growth generated by a type of potential. Medium = moderate growth generated by untapped potential due to the presence of a border. High = high growth generated by

* Depends on the type of competitiveness considered.

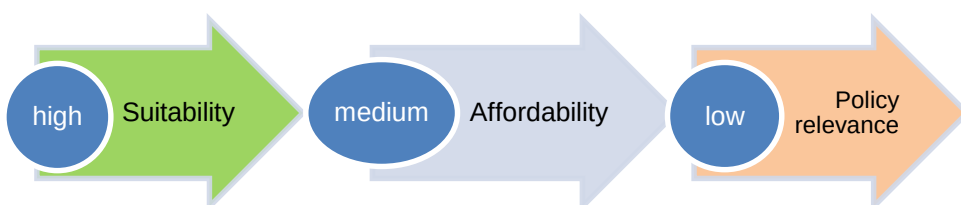
* The relevance is high where there are dense urban areas at cross-border level; low elsewhere.

** the relevance is related to the potential for cooperation: high where there are natural resources on both sides of the border; low where natural resources are lacking.

2.1. CROSS-BORDER OBSTACLES

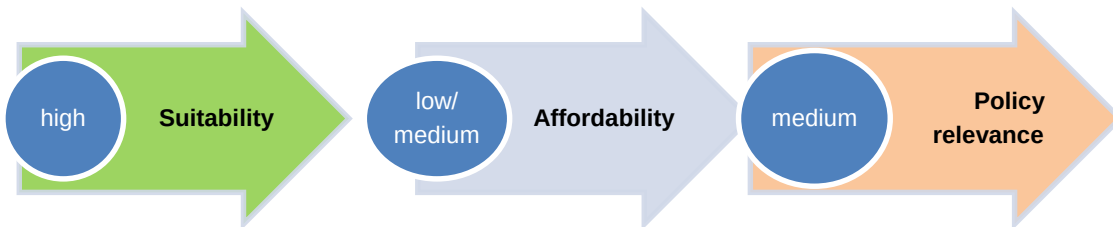
The category of obstacles includes:

Socio-economic disparities



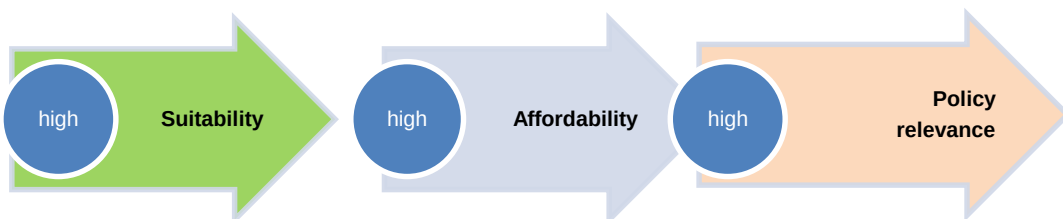
- High cross-border socioeconomic disparities, e.g. income, capital, financial products, patterns of consumption or behaviour, reduce the opportunities to cooperate and limit the benefits of networking.
- Reducing disparities contributes to better economic and social cohesion and is very suited to the scope of CBC (Article 174 of the TFEU).
- Individual policy intervention affordability depends on the investments required to overcome the barrier, i.e. equipment or infrastructure are costlier than networking or capacity building.
- At EU28 level, addressing this obstacle through specific CBC policies is less urgent, considering the limited untapped potential.

Physical



- Cross-border areas have different geographies. Some land borders are in the mountains, or are large rivers, while maritime border regions deal with specific disadvantages related to the sea. Physical obstacles limit opportunities for people to access goods and services on the other side of the border.
- Making the physical obstacles more permeable is a prerequisite (cross-cutting factor) for improving the flow of people and goods at cross-border level, contributing to territorial cohesion.
- The amount of investment is, on average, high for new transport infrastructure and low to medium for the improvement or modernisation of existing transport.
- Addressing this obstacle could be a priority in some border areas for specific CBC interventions.

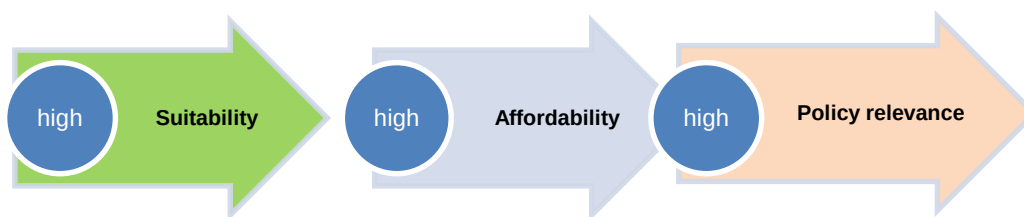
Cultural



- This category mainly refers to 'intangible' obstacles and includes language barriers, cultural differences and lack of trust in people living on the other side of a border. Cultural obstacles are partly subjective and depend on opinions and experiences. Great cultural barriers can lead to misunderstandings and a lack of trust between people.

- Addressing cultural obstacles could improve the sense of community on both sides of the border and contribute to greater social cohesion. Addressing the cultural dimension of cooperation is a prerequisite for socio-economic development and cohesion and fits well with CBC objectives and policy tools.
- The expected costs of intervention to overcome this obstacle are low compared to investments in infrastructure; hence for CBC this is highly affordable.
- On average, overcoming cultural obstacles by tapping the potential at territorial level should have a significant impact at EU level.

Normative and institutional

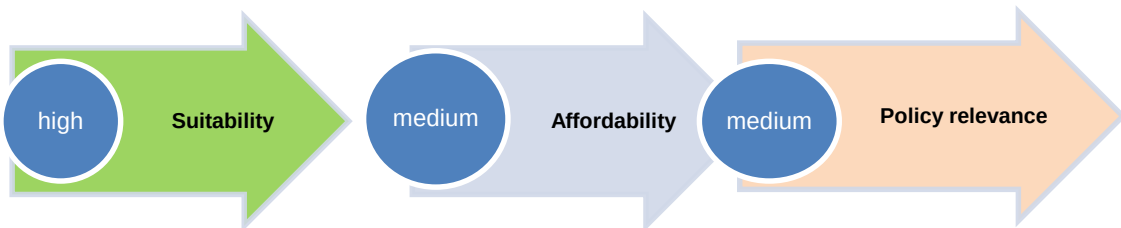


- These are legal and administrative barriers related to education, labour mobility, health and administrative cooperation between local and regional public organisations in various fields including environmental and risk management, e.g. adaptation to climate change, common industrial risks and natural hazards.
- Addressing normative and institutional obstacles, as a cross-cutting theme of intervention, should contribute to harmonisation of rules and procedures, reduce administrative costs for business, increase flows of people, goods and services and information across the border, and ensure more territorial, economic and social cohesion.
- Addressing these obstacles are highly affordable for CBC programmes, since the cost of overcoming administrative barriers is generally low, covering capacity building, training, networking and small territorial level investments.
- This category of obstacles hampers the full use of potential in cross-border regions. Therefore, it should be highly prioritised.

2.2. CROSS-BORDER POTENTIAL

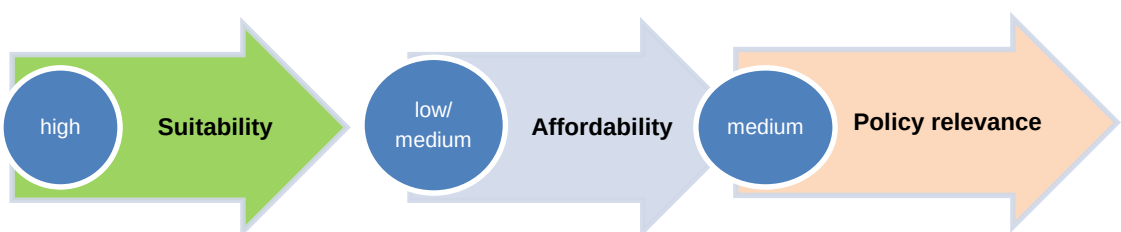
The categories of potential include:

Competitiveness



- This covers R&D and knowledge activities in private and public organisations, e.g. enterprises, clusters, universities, research centres, as well as 'tangible' cultural assets in border regions, e.g. the potential for tourism. Tapping into this potential contributes to EU development and growth in terms of innovation, employment and income and to greater economic cohesion in border regions.
- Small investments in equipment should be affordable for CBC programmes if they are not dealing with basic research infrastructure and investment in potential through R&D.
- The policy relevance depends on the field considered, which is less evident for pure research.

Market integration

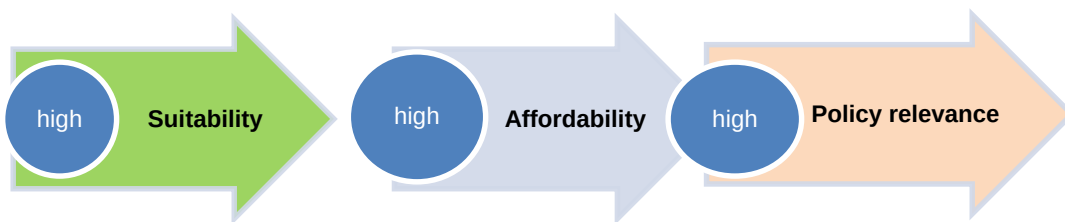


- Refers to accessibility (time and distance) to economic products and services in border areas as well as the degree of labour market integration. Promoting market integration improves the flow of people, goods and

services across the border and with that, economic, social and territorial cohesion.

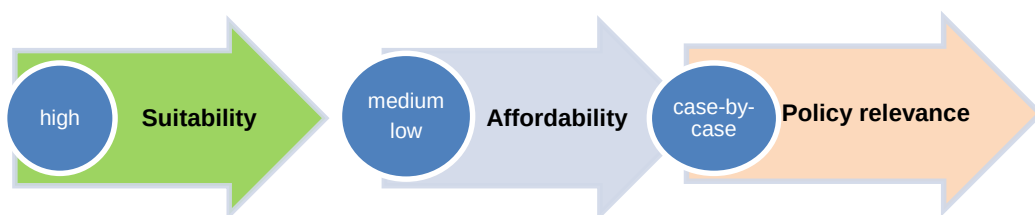
- Intervention in the labour market or optimising communication networks should be affordable, but investment in new infrastructure or communication networks is more expensive.
- In general, but depending on the cross-border region, there is the potential to generate growth.

Human and social capital



- This covers the level of education, skills and social cohesion across borders. Developing education, increasing social trust and improving skills and competence promote economic and social cohesion.
- Implementing social capital is generally affordable as this concerns intangible assets or small infrastructure.
- The impact on growth is high, as human and social capital are key factors in economic development.

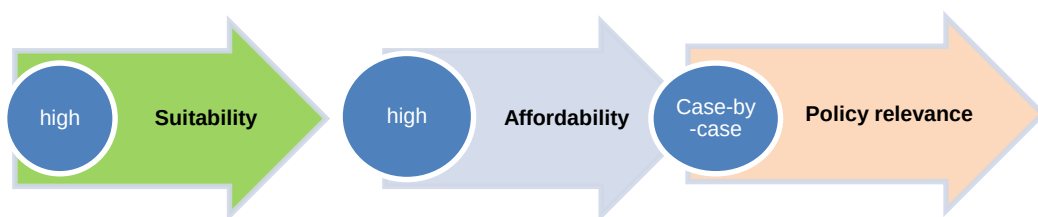
Integrated services for cross-border functional urban areas



- More integrated urban services, e.g. local transport as well as education, health, energy, green and sport infrastructure mean more available services, lower investment and management costs, and more opportunity for cultural exchanges, which leads to greater territorial, social and economic cohesion.

- As regards new infrastructure and equipment, the cost to increase service supply is moderate to high; but should be more affordable when investing in existing networks and equipment.
- Developing integrated services in urban areas generates modest growth on average, and is only relevant for populated areas. The situation needs to be assessed, on a case-by-case basis, for each border area with high population density.

Potential from shared management of natural resources



- Natural and protected areas in cross-border regions are opportunities for alternative economic activities, e.g. green tourism, environmental education, green agriculture. They also provide primary ecological services (CO2 storage, water and air purification, amenities for people). This potential contributes to environmental sustainability goals, as well as territorial and economic cohesion.
- Investment in the shared management of existing natural and protected areas is highly affordable for CBC programmes (as mainly related to 'intangible' activities and small investments). The relevance of the policy intervention needs to be assessed on a case-by-case basis and is limited to a few border areas with an abundance of natural areas on both sides of the border.

2.3. CONCLUSIONS SECTION 2

- The main border region obstacles identified in the inventory cover socio-economic disparities, physical obstacles, cultural, normative and institutional obstacles. The potential of each border region is mainly linked to the competitiveness of cross-border public and private organisations, market integration of activities and people, human and social capital, integrated services and the shared management of natural capital.
- The affordability ranks from low for investment in new infrastructure, e.g. physical obstacles, to high for intangible assets, e.g. cultural obstacles or human and social capital. A majority of needs can be addressed through standard CBC policy instruments.
- Addressing the obstacles in a CBC framework is generally highly relevant for the cultural, legal and normative obstacles, as well as for potential concerning competitiveness and social and human capital. It is medium for physical obstacles and low for the others. Low relevance means there is less opportunity to address the need under strict cross-border policy. The relevance estimation has to be confirmed for each border region, taking into account the local conditions and the specific growth path.

3. INDICATOR DATABASE

This section illustrates the list of indicators identified to quantify needs. All indicators and related needs are reported in a separate database.

The indicators differ in terms of their level of aggregation, units of measurement, e.g. index, physical unit, or percentages and type, e.g. flows, functional characteristics or units. In addition, some of these measure perceptions of people and others relate to physical phenomena at cross-border level. In some cases, more than one indicator is associated with a specific need, especially when the need is aggregated and covers different fields or socio-economic sectors, e.g. socio-economic disparities or social and human capital. Indicators on perception enhance understanding of the need with objective data, e.g. physical obstacles.

The database presents the indicators at border region level in two ways. First, indicators are reported in absolute values, secondly according to the position of the specific border region against the average of border regions. Thresholds are expressed based on the indicator average value. Below or above the average means a low or high intensity for the obstacle, while for the types of potential the indicator measures the endowment of a resource as low or high. However, interpretation of the indicator depends on the need as well as the context of analysis.

The following tables illustrate indicators that quantify the needs. More information is provided in the excel spreadsheet, which also includes additional indicators collected during the study. The tables indicate, where appropriate, the specific dimension (in brackets) measured by each indicator for each type of obstacle and potential.

Table 2 - Indicators associated with obstacles

N	Obstacle	Indicator	Type of data	Territorial coverage of the data source	Interpretation
I_1	Socio-economic disparities	GDP per head ratio (index of socio-economic disparities in GDP per capita across the border)	Objective data	NUT3 level /25 km buffer	It detects whether a border region has significantly different levels of GDP per capita on the two sides of the border using the buffer population for weighting the data. An increase in the indicator value means a greater obstacle.
I_2	Socio-economic disparities	Coefficient of variation of GDP per capita among the NUTS3 regions in the border region	Objective data	NUTS3 level	This measures the disparities of GDP per capita within the cross-border region. An increase in the indicator value means a greater obstacle.
I_3	Socio-economic disparities (perception)	Socio-economic disparities as a perceived obstacle to CBC	Data on perception	NUTS3 level	This measures the perception of people living in border regions on the relevance of socio-economic disparities to CBC. An increase in the indicator value means a greater obstacle.
I_4	Physical obstacles (perception)	Difficulty in physical accessibility perceived as an obstacle to cross-border cooperation	Data on perception	NUTS3 level	This measures the perception of people living in the border regions of physical accessibility. An increase in the indicator value means a greater obstacle.
I_5	Physical obstacles	River barriers	Objective data	25 km buffer (land regions)	This is a GIS-based indicator measuring the relevance of rivers as physical border obstacles. It has a value of "1" when the river is a physical obstacle and "0" when it is not.
I_6	Physical obstacles	Mountain barriers	Objective data	25 km buffer (land regions)	This is a GIS-based indicator measuring the relevance of mountains as physical border obstacles. It takes value "1" when a mountain is a physical obstacle and "0" when it is not.

N	Obstacle	Indicator	Type of data	Territorial coverage of the data source	Interpretation
I_7	Cultural obstacles	Language barriers perceived as an obstacle to CBC	Data on perception	NUTS3 level	This measures the perception of people living in the border regions on the relevance of language differences to CBC. An increase in the indicator value means a greater obstacle.
I_8	Cultural obstacles	Cultural differences perceived as an obstacle to CBC	Data on perception	NUTS3 level	This measures the perception of people living in the border regions on the relevance of cultural differences on CBC. An increase in the indicator value means a greater obstacle.
I_9	Cultural obstacles	Lack of trust in people on the other side of the border	Data on perception	NUTS3 level	This measures the lack of trust of people living on the other side of a CBC border. An increase in the indicator value means a greater obstacle.
I_10	Normative and institutional obstacles	Legal and administrative barriers perceived as an obstacle to CBC	Data on perception	NUTS3 level	The indicator measures the perception of people living in the border regions on the relevance of legal and administrative barriers to CBC. An increase in the indicator value means a greater obstacle.

Table 3 - Indicators associated to types of potential

N	Potential	Indicator	Type of data	Territorial coverage of the data source	Interpretation
I_11	Competitiveness potential (knowledge creation)	Patent applications index (2012)	Objective data	NUTS3	The indicator represents a need. More patent applications in a region means lower need and a smaller value of the indicator. An increase in the indicator value means greater potential for growth.
I_12	Competitiveness potential (product innovation)	Trade marks applications index(2012)	Objective data	NUTS3	More trademark applications mean lower need and thus a smaller value of the indicator. An increase in the indicator value means a greater potential for growth.
I_13	Competitiveness potential (cultural activities)	Cultural activity index (2011-2012)	Objective data	NUTS3	More cultural events mean a lower need and thus a smaller value of the indicator. An increase in the indicator value means a greater potential for growth.
I_14	Competitiveness potential (industrial activity)	Industrial activity index (2015)	Objective data	NUTS3	A higher intensity of industrial activity means a lower need and thus a smaller value of the indicator. An increase in the indicator value means a greater potential for growth.
I_15	Market integration potential (multimodal)	Multimodal accessibility index (2006)	Objective data	NUTS3	An increase in the indicator value means greater potential for growth.

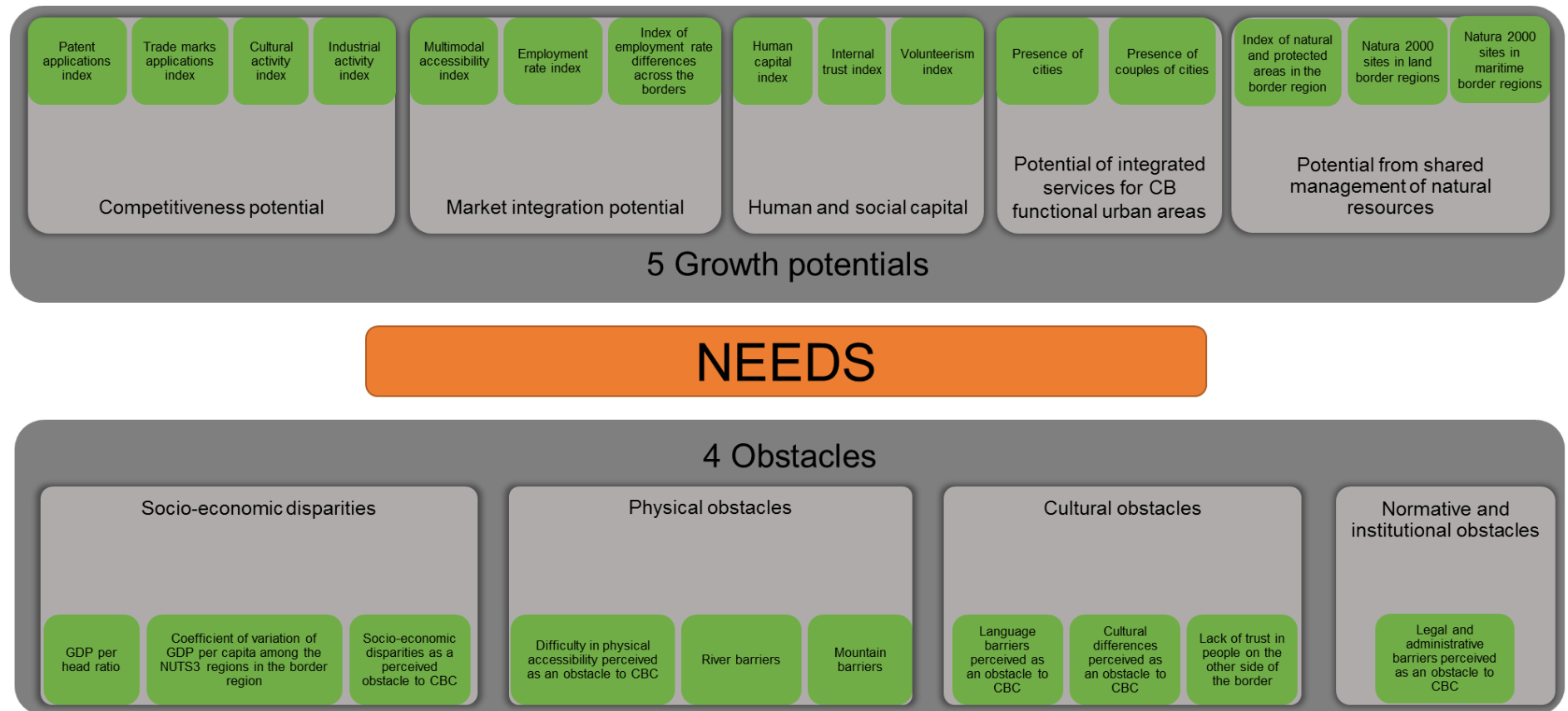
N	Potential	Indicator	Type of data	Territorial coverage of the data source	Interpretation
	accessibility)				
I_16	Market integration potential (cross-border labour market)	Employment rate index (2015)	Objective data	NUTS3	An increase in the indicator means greater potential for growth.
I_17	Market integration potential (cross-border labour market)	Index of employment rate differences across the borders (2015)	Objective data	NUTS3	Higher differences in the employment rate across the border means a higher need reflected in a higher value of the indicator.
I_18	Human and social capital (education level)	Human capital index (2011)	Objective data	NUTS3	An increase in the indicator value means greater potential for growth.
I_19	Human and social capital (internal trust)	Internal trust index (2008-2009)	Objective data (survey)	NUTS3	This indicates the internal trust in each border region. The lower the internal trust, the higher the growth potential. Thus the indicator value is higher.
I_20	Human and social capital (volunteerism)	Volunteerism index (2008-2009)	Objective data (survey)	NUTS3	More survey respondents that volunteer means a lower need for volunteerism in the area and a smaller value of the indicator. An increase in the indicator value means greater potential for growth.

N	Potential	Indicator	Type of data	Territorial coverage of the data source	Interpretation
I_21	Potential of integrated services for cross-border functional urban areas (presence of cities)	Presence of cities (2015)	Objective data	25 km buffer	This calculates the number of cities, according to Eurostat, in the 25 km buffer. More cities represent more potential for integrated cross-border services.
I_22	Potential of integrated services for cross-border functional urban areas (presence of coupled cities)	Presence of couples of cities (2015)	Objective data	25 km buffer (land borders)	This calculates the number of cross-border coupled cities. More couples represent higher potential for integrated cross-border services.
I_23	Potential from natural resources (natural and protected area)	Index of natural and protected areas in the border region (2006)	Objective data	NUTS3	A low value of the indicator means less green areas (natural and protected) in the border region. Since the potential is related to shared management, more areas mean greater potential for cooperation.
I_24	Potential from natural resources (natural and protected area)	Natura 2000 sites in land border regions (2006)	Objective data	25 km buffer	The higher the number of NATURA 2000 areas, the higher the potential for shared management of natural resources.
I_25	Potential from natural resources (natural and	Natura 200 sites in maritime border regions	Objective data	25 km buffer	The higher the indicator value, the higher the potential for shared

N	Potential	Indicator	Type of data	Territorial coverage of the data source	Interpretation
	protected area)	(2006)			management of natural resources.

The following figure shows, for the set of border obstacles and potentials, the corresponding set of indicators in the database.

Figure 1 - Overview of the indicators' database structure



4. MAPPING OF BORDER REGIONS

This section illustrates the main obstacles and potentials in border regions with maps and figures.

4.1. IDENTIFICATION OF BORDER REGIONS

A total of 62 border regions is analysed in this study, encompassing 45 land border regions and 17 maritime border regions (see maps in Annex 2).

The most populated EU border areas have more than 35 million inhabitants; namely France-UK, Denmark-Sweden, Germany-Denmark, Belgium-UK and Ireland-UK for maritime borders and Belgium-Netherlands, Germany-Netherlands, Germany-France, Belgium-France and Czech Republic-Poland for land borders. The most populated border is the France-UK maritime border, with a population of 14 million (see maps in Annex 2).

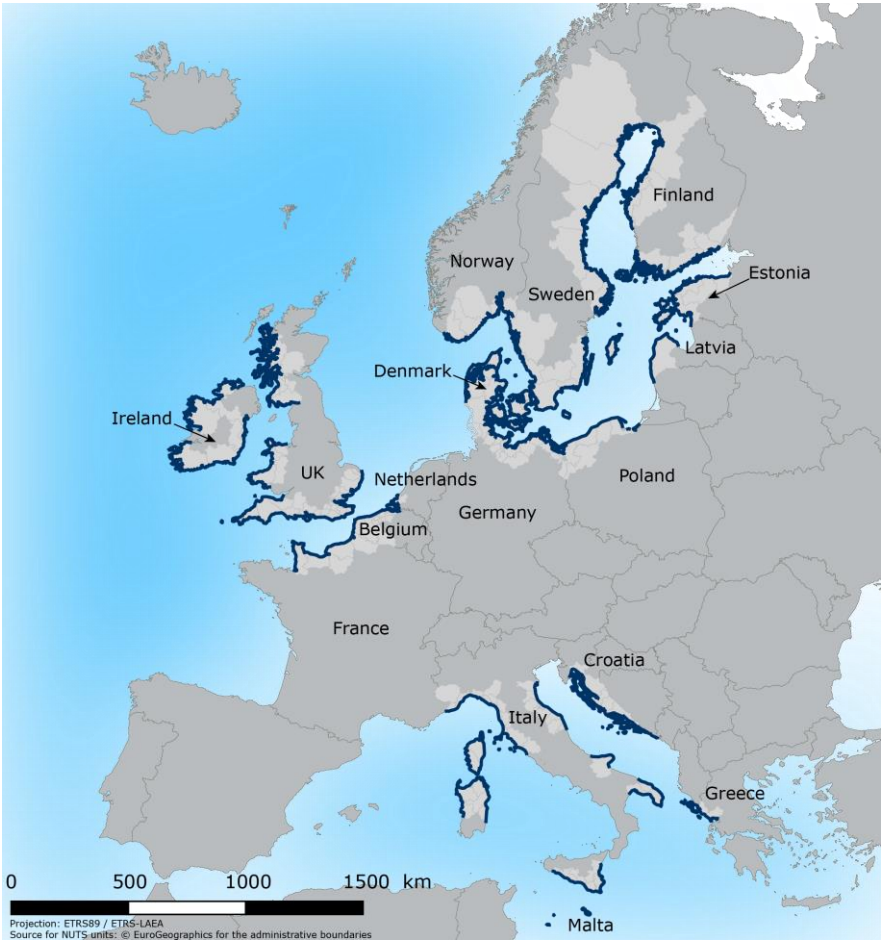
Two areas located around the Channel and around Italy are the most densely populated. The densely populated EU border areas are Denmark-Sweden, Belgium-Netherlands, France-Netherlands, Germany-France, Switzerland-Germany and Belgium-France for land borders and France-UK, Italy-Malta, Greece-Italy and Belgium-UK for maritime borders. The density of population for these varies from 165 inhabitants per square km to 1,340 inhabitants per square km near Oresund bridge (see maps in Annex 2).

From 2008 to 2015, the population grew in most EU border regions except in the eastern regions and in Germany where the population fell. For the most populated and most densely populated border areas, the population grew, especially in the Denmark-Sweden maritime border region. In the German regions, the most densely populated and most populated land border areas saw very low or even negative population growth (see maps in Annex 2).

Map 1 - Land borders



Map 2 - Maritime borders



Border regions

Type of border regions

- Maritime
- Land

Spain: Name of the country involved in a border

- NUTS 3 of the border regions
- Area not included in the study

4.2. GROUPS OF BORDER REGIONS BY OBSTACLES

Socio-economic disparities

Socio-economic disparities are illustrated comparing the NUTS3 GDP per capita of the two countries, weighting the values by the region's population. An increase in indicator value means a greater obstacle.

- Land border regions with high socio-economic disparities are Austria-Czech Republic, Austria-Hungary, Austria-Liechtenstein, Austria-Slovenia, Belgium-Luxembourg, Bulgaria-Greece, Switzerland-Germany, Switzerland-France, Switzerland-Italy, Czech Republic-Germany, Germany-Luxembourg, Germany-Poland, Denmark-Sweden, Finland-Norway, France-Luxembourg, Hungary-Slovakia and Italy-Slovenia²⁸.
- Maritime border regions with greater socio-economic disparities are: Germany-Denmark, Germany-Sweden, Denmark-Poland, Estonia-Finland, Estonia-Latvia, France-UK, Croatia-Italy and Latvia-Sweden.

Difficulty in physical accessibility

The database highlights physical obstacles using indicators on perception as well as on geographical features. The indicator on the perception of physical obstacles illustrates a greater obstacle in the following borders (maps are provided in Annex 2):

- Belgium-Luxembourg, Poland-Slovakia, France-Italy, Austria-Italy, Germany-Poland, Switzerland-France, Italy-Slovenia, Lithuania-Poland, Bulgaria-Romania, Czech Republic-Poland, Austria-Czech Republic, France-Luxembourg, France-UK and Finland-Norway for land borders.
- Latvia-Sweden, Greece-Italy, Germany-Sweden, Denmark-Poland, Netherlands-UK, Finland-Sweden, France-Italy, Italy-Malta and France-UK for maritime borders.

Indicators on geographical features locate where a river, or mountains, or both can hinder cross-border development. The analysis of the indicators shows that:

²⁸ For instance, in the case of Slovakia-Hungary border, the disparity has a specific geographical dimension, the Slovakian part being richer than the Hungarian and because GDP per capita polarizes in the two capital cities (Bratislava and Budapest) where a large part of the population lives and works.

- Five border areas (Austria-Germany, Switzerland-Germany, Spain-Portugal, Croatia-Slovenia, Hungary-Slovakia) have both rivers and mountains as physical obstacles.
- Seven border areas (Austria-Slovakia, Belgium-Netherlands, Bulgaria-Romania, Germany-France, Germany-Netherlands, Germany-Poland, Croatia-Hungary) have rivers as physical obstacles.
- Nineteen other border areas have mountains as physical obstacles.
- The other border areas have no physical borders.

Cultural obstacles

Three indicators highlight cultural obstacles based on the 422 Eurobarometer survey (2015) measuring the perception of respondents to the importance to cross-border cooperation activities of language barriers, cultural differences and lack of trust in people living on the other side of the borders. Border regions with higher than average obstacles for all the three barriers (language, cultural and lack of trust) are (See Annex 2):

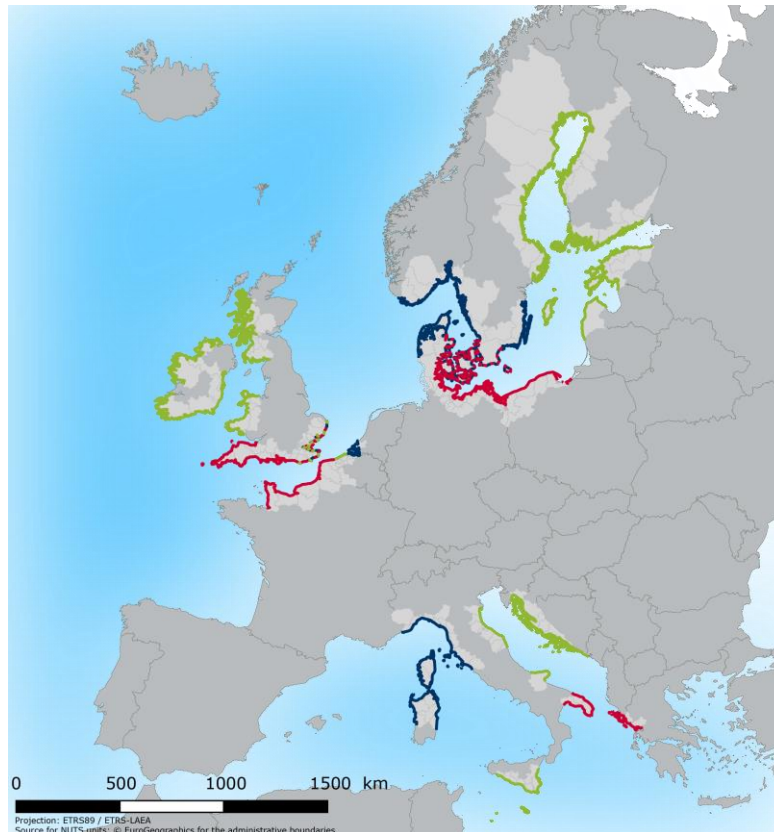
- land border regions, Austria-Czech Republic, Austria-Slovakia, Bulgaria-Greece, Czech Republic-Germany, Czech Republic-Poland, Germany-Poland, France-UK, Italy-Slovenia, Lithuania-Poland,
- maritime border regions, Germany-Sweden, Denmark-Poland and France-UK.

Legal and administrative barriers

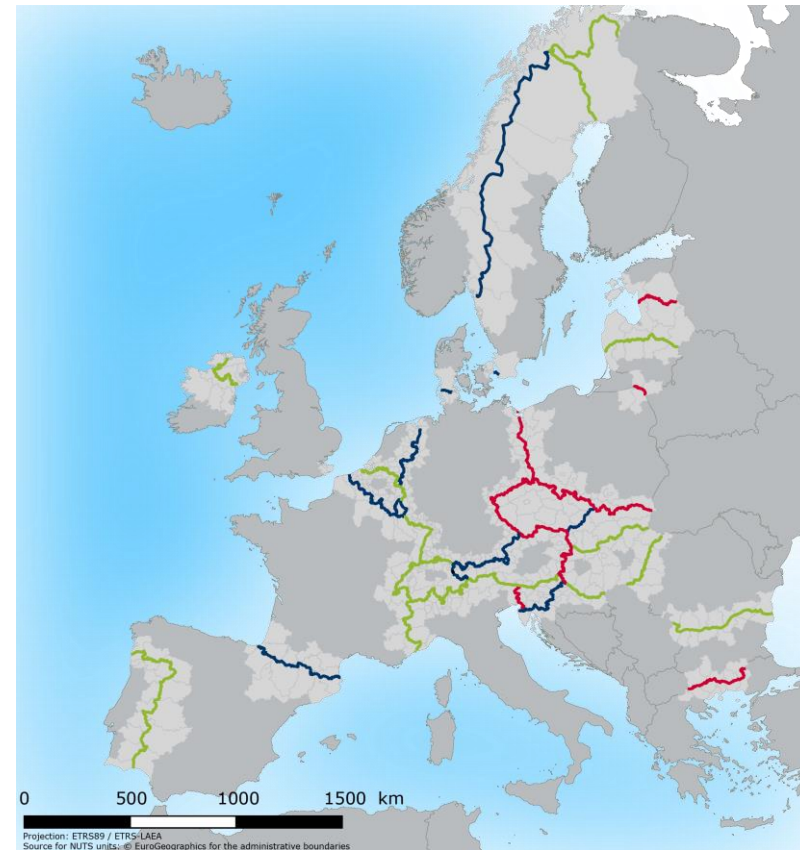
One indicator measures the perception of people living in border regions on the relevance of legal and administrative barriers to CBC. An increase in the indicator value means a greater obstacle. Borders with higher obstacles than average are (maps are provided in Annex 2):

- Austria-Switzerland, Austria-Czech Republic, Austria-Hungary, Austria-Italy, Austria-Slovakia, Belgium-France, Belgium-Luxembourg, Switzerland-France, Switzerland-Germany, Switzerland-Italy, Germany-France, Czech Republic-Germany, France-Italy, Germany-Poland, Italy-Slovenia, Lithuania-Poland, France-Luxembourg and France-UK for land borders;
- Estonia-Finland, Greece-Italy, Germany-Sweden, France-Italy, Italy-Malta, and France-UK for maritime borders.

Map 3 - Cultural obstacles (maritime border regions)



Map 4 - Cultural obstacles (land border regions)



Cultural obstacles: Combination of Language barriers with Cultural differences and Lack of trust on people living beyond the border (perceived)

Relevant position of the border region compared to EU border region average

- Less obstacle
- Average
- More obstacle
- N.A.

- NUTS 3 of the border regions
- Area not included in the study

4.3. GROUPS OF BORDER REGIONS BY TYPES OF POTENTIAL

Competitiveness

The potential for competitiveness in border regions is measured through four indicators. These are defined to measure the endowment needs²⁹. Therefore, the lack of a specific resource, e.g. patents, indicates an endowment need and a higher value of the indicator. An increase in the indicator value means greater potential for growth.

The four indicators cover:

- patent applications to the EPO per million inhabitants, which measure knowledge creation,
- trade mark applications to the EPO per million inhabitants, which measures product innovation,
- cultural events per million inhabitants as a proxy indicator for cultural activities and,
- the share of industrial activity, which measures the intensity of industrial activity in the border region.

The database shows that in one land border region (Bulgaria-Greece) and two maritime ones (Greece-Italy and Italy-Malta) all the types of potential are high compared to the average of all border regions. Filters in the database make it possible to illustrate each of the proposed indicators. For instance, the border regions with high potential for both product innovation (trademark applications index) and industrial activity (industrial activity index) are:

- Bulgaria-Greece, Finland-Norway, Belgium-UK, Estonia-Latvia for land borders,
- Greece-Italy, Latvia-Sweden and Italy-Malta for the maritime group.

Market integration potential

Market integration potential is measured through three indicators. These are defined to measure the endowment needs. One focuses on multimodal accessibility and two on cross-border labour market integration. The first measures the endowment need of employment, while the second is an index of employment rate

²⁹ Actual endowment needs will be defined in Section 5. The endowment needs proposed in this section must be considered as potential.

differences across the borders. When the first indicator increases, it means there is higher potential since there is a low employment rate. When the second indicator is higher because of a big difference in employment rates across the border, there is potential for cross-border labour market integration and harmonisation.

The following have higher potential for multimodal accessibility (see maps in Annex 2):

- Austria-Switzerland, Bulgaria-Greece, Bulgaria-Romania, Switzerland-Germany, Switzerland-France, Estonia-Latvia, Spain-Portugal, Finland-Norway, Finland-Sweden, Croatia-Hungary, Croatia-Slovenia, Hungary-Romania, Ireland-UK, Lithuania-Latvia, Lithuania-Poland, Norway-Sweden and Poland-Slovakia for land borders;
- Denmark-Norway, Estonia-Finland, Estonia-Latvia, Greece-Italy, Finland-Sweden, Croatia-Italy, Italy-Malta and Latvia – Sweden for maritime borders.

The following border areas have high potential (i.e. high differences in employment rates, see maps in Annex 2):

- Austria-Hungary, Austria-Lichtenstein, Belgium-Germany, Belgium-France, Bulgaria-Greece, Bulgaria-Romania, Switzerland-France, Czech Republic-Slovakia, Germany-Denmark, Germany-France, Spain-France, Spain-Portugal, Finland-Sweden, France-Italy, France-Luxembourg, France-UK, Croatia-Hungary, Hungary-Slovenia, Ireland-UK, Poland-Slovakia for land border regions;
- Germany-Sweden, Greece-Italy, France-Italy, Italy-Malta, Latvia-Sweden for maritime border regions.

Analysis of the employment differences shows that the following regions have a high potential compared to the average:

- Austria-Lichtenstein, Austria-Slovakia, Belgium-France, Belgium-Luxembourg, Belgium-Netherlands, Bulgaria-Greece, Bulgaria-Romania, Switzerland-France, Czech Republic-Poland, Germany-France, Germany-Luxembourg, Spain-France, Finland-Norway, Finland-Sweden, France-Italy, France-Luxembourg, France-UK, Lithuania-Latvia for land border regions;
- Germany-Sweden, Estonia-Latvia, France-Italy, France-UK, Ireland-UK, Italy-Malta, UK-Netherlands for the maritime border regions.

Human and social capital

Three indicators measure human and social capital potential, such as the needs for tertiary education, internal trust and volunteerism. As above, the indicators are formulated to measure the endowment needs, so the indicator increases when an endowment is less available and the growth potential is higher.

Focusing on tertiary education, the potential is high in:

- Austria-Czech Republic, Austria-Italy, Austria-Hungary, Austria-Liechtenstein, Austria-Slovenia, Austria-Slovakia, Bulgaria-Romania, Switzerland-Italy, Czech Republic-Poland, Czech Republic-Slovakia, Estonia-Latvia, Spain-France, Spain-Portugal, Croatia-Hungary and Hungary-Romania, Hungary-Slovenia, Hungary-Slovakia, Italy-Slovenia, Lithuania-Poland, Poland-Slovakia for land border regions.
- Denmark-Poland, Greece-Italy, France-Italy, Croatia-Italy and Italy-Malta for maritime border regions.

By combining internal trust and volunteering, it is possible to identify the following land border regions with high potential for both indicators: Austria-Slovenia, Austria-Slovakia, Czech Republic-Slovakia, Estonia-Latvia, France-Luxembourg, Croatia-Slovenia, Hungary-Romania, Lithuania-Latvia.

Potential of integrated services for cross-border functional urban areas

This potential is measured through the number of cities and the number of cross-border coupled cities. The first calculates the number of cities in the 25 km buffer. More cities are a proxy indicator for higher potential in cross-border integrated services. This indicator covers both maritime and land regions.

- The database shows that land border areas with many cities³⁰ are Belgium-France, Belgium-Netherlands, Czech Republic-Poland, Germany-France and Germany-Netherlands.
- The research team has identified coupled cities based on the distance between existing cities. In addition to the previously mentioned border areas (Belgium-France, Belgium-Netherlands, Czech Republic-Poland, Germany-France, Germany-Netherlands), other border areas have coupled cities that could be used in a cross-border network to develop and deliver integrated services. There are varying numbers of these cities. In particular, Bulgaria-Romania, Germany-Luxembourg, Denmark-Sweden and France-Italy have only one coupled city as there are few cities in these border areas (See Annex 2).

³⁰ The threshold for being “many cities” in this section is seven. Other thresholds could be applied directly by using filters in the database.

- Switzerland-France, Switzerland-Germany, Switzerland-Italy and Spain-France have two or three coupled cities with a limited number of cities (See Annex 2).
- Almost all maritime border areas have a city, except for Estonia-Latvia. Maritime borders with many cities are Germany-Denmark, Denmark-Sweden, France-Italy, Belgium-UK, France-UK. The last two have the most of all the border areas, with 18 and 45 cities respectively. Cities that are not included in the maritime border couples still show potential for cross-border integrated development.

Potential from shared management of natural resources

The database provides three indicators: one at NUTS3 level (Index of natural and protected areas in the border region) and the two others at 25 km buffer level, counting respectively the Natura 2000 sites in land and maritime regions. A low value of the first indicator means less green areas (natural and protected areas) in the border region. Since the potential is related to shared management, high endowments imply a high potential for cooperation.

For the index of natural and protected areas in the border region, the following have higher endowments and thus high potential for shared management:

- Austria-Switzerland, Austria-Germany, Austria-Italy, Austria-Lichtenstein, Austria-Slovenia, Bulgaria-Greece, Switzerland-France, Estonia-Latvia, Spain-France, Spain-Portugal, Finland-Norway, Finland-Sweden, France-Italy, Croatia-Slovenia, Italy-Slovenia, Norway-Sweden for land borders.
- Estonia-Finland, Estonia-Latvia, Finland-Sweden, France-Italy, Latvia-Sweden for maritime borders.

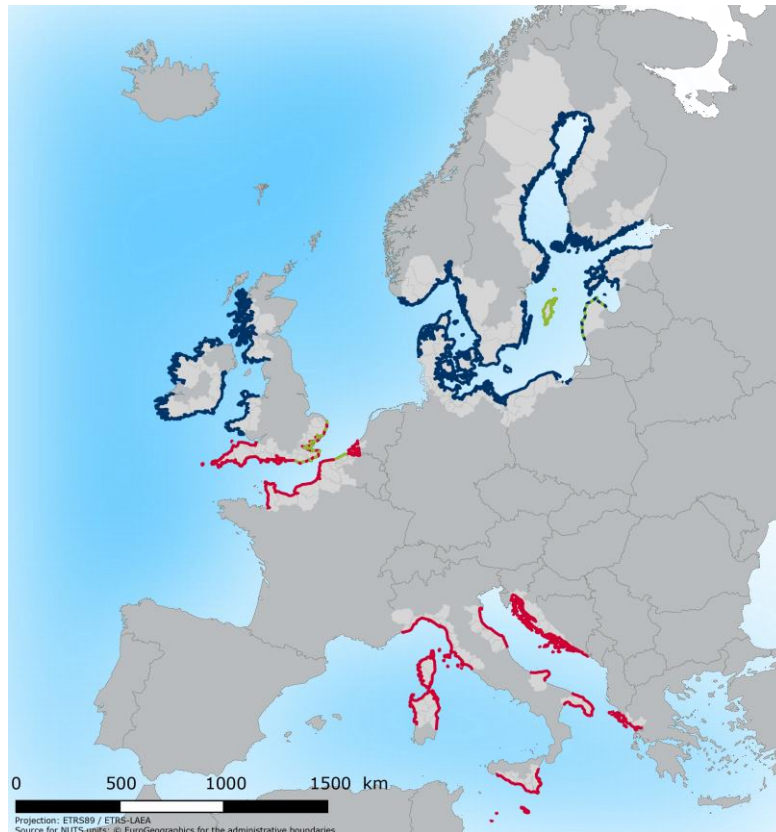
The two indicators on the number of NATURA 2000 are calculated differently. The index on land border regions is the sum of Natura 2000 areas in both countries situated in a 50km*50km square across the border, given that at least one Natura 2000 is present on each side of the border within the same square. The index on maritime border regions is the sum of Natura 2000 areas situated in a 25 km buffer form the coastline of each of the two countries, given that at least one Natura 2000 is present in each country buffer area.

- Land borders with the most NATURA 2000 areas are the Czech Republic-Germany, Germany-Poland and Spain-France. Other land border regions with more than 300 NATURA 2000 areas are Austria - Czech Republic, Austria - Germany, Austria - Slovakia, Belgium - France, Belgium - Netherlands, Bulgaria - Greece, Bulgaria - Romania, Switzerland - Italy, Czech Republic - Poland, Czech Republic - Slovakia, Germany - France, Germany - Netherlands, France-Italy, Croatia-Hungary, Croatia-Slovenia,

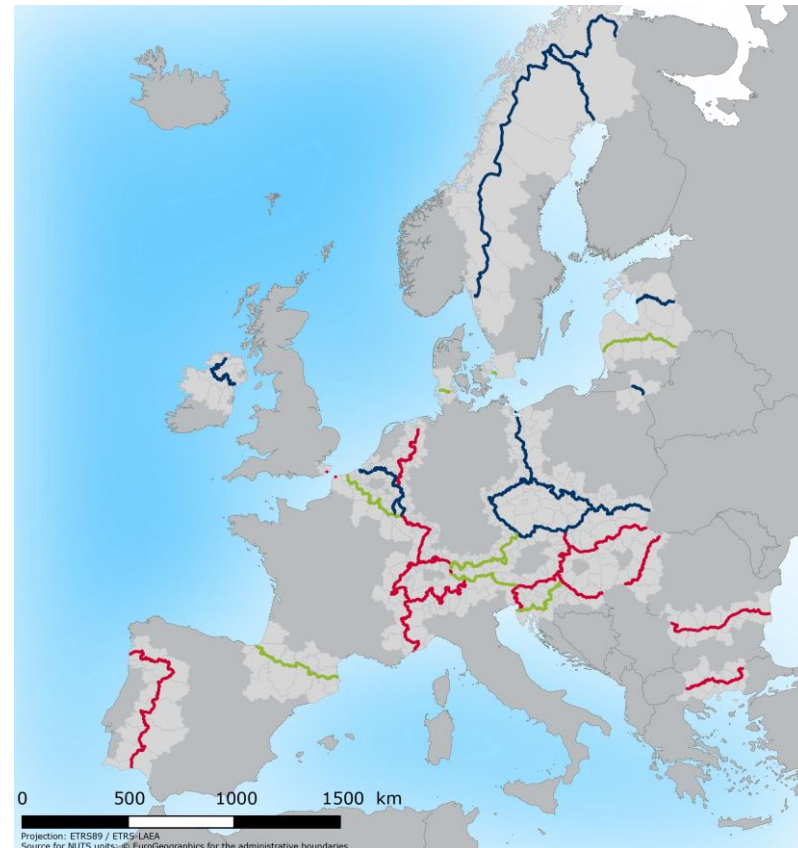
Hungary-Romania, Hungary-Slovakia, Poland -Slovakia, as well as Spain-Portugal.

- Maritime border regions with the most NATURA 2000 areas are Denmark – Sweden, Finland – Sweden and Croatia – Italy.

Map 5 - Competitiveness potential (cultural activities)



Map 6 - Competitiveness potential (cultural activities)



Cultural activity index

Relevant position of the border region compared to EU border region average

- Less potential
- Average
- More potential

- NUTS 3 of the border regions
- Area not included in the study

4.4. OVERVIEW OF BORDER REGION NEEDS

The following tables show obstacles and potentials in land and maritime border regions. Each obstacle or potential is matched with each border region when its value is high compared to the average of all border regions³¹.

- **Land border regions with more obstacles to cooperation**, above average for at least two of the categories are: Italy-Slovenia, Germany-Poland, Austria-Czech Republic, Switzerland-Italy, Switzerland-France, Switzerland-Germany, Lithuania-Poland, France-UK, France-Luxembourg, Czech Republic-Poland, Czech Republic-Germany, Bulgaria-Greece;
- **Maritime regions with more obstacles to cooperation** are France-UK, Denmark-Poland, Greece-Italy, Italy-Malta, Germany-Sweden;
- **Land border regions with more competitiveness potential and market integration potential** are Bulgaria-Greece, Bulgaria-Romania, Spain-Portugal, Croatia-Hungary, Hungary-Romania, Hungary-Slovenia, Hungary-Slovakia;
- **Land border regions with more potential for human and social capital** are Estonia-Latvia, Hungary-Romania, Czech Republic-Slovakia, Austria-Slovenia, Austria-Slovakia;
- **Land border regions with more market integration potential** are Bulgaria-Greece, Bulgaria-Romania, Switzerland-France, Finland-Sweden;
- **Land border regions with more potential for integrated services in cross-border functional urban areas** are Belgium-France, Belgium-Netherlands, Czech Republic-Poland, Germany-France, Germany-Netherlands;
- **Maritime regions with more potential for competitiveness and market integration** are Greece-Italy, Italy-Malta, Latvia-Sweden, Croatia-Italy;
- **Maritime regions with more potential for human and social capital** are Denmark-Poland, Croatia-Italy, Italy-Malta;
- **Maritime regions with more potential for integration of services between cities** are Belgium-UK, Germany-Denmark, France-Italy, Denmark-Sweden, France-UK;
- **Maritime regions with more potential from shared management of natural resources** are Latvia-Sweden, Estonia-Finland, Estonia-Latvia, Finland-Sweden, France-Italy;

³¹ For the two indicators (number of cities and number of coupled cities) for integrated services potential. In cross-border functional urban areas, the research team considered the ten highest values.

- **Land border regions with more potential from shared management of NATURA 2000 areas** are Spain-France, Spain-Portugal, France-Italy, Croatia-Slovenia, Bulgaria-Greece, Austria-Germany;
- **Maritime border regions with the most NATURA 2000 areas** are Denmark – Sweden, Finland – Sweden and Croatia – Italy.

Table 4 - Obstacles in land border regions³²

Border region	Socio-economic disparities	Physical obstacles (perceived difficult access)	Physical obstacles (river)	Physical obstacles (mountains)	Cultural obstacles (language)	Cultural obstacles (culture)	Cultural obstacles (trust)	Normative and institutional obstacles
Austria-Switzerland								
Austria-Czech Republic								
Austria-Germany								
Austria-Hungary								
Austria-Italy								
Austria-Lichtenstein								
Austria-Slovenia								
Austria-Slovakia								
Belgium-Germany								
Belgium-France								

³² No information on physical obstacles, cultural obstacles or normative and institutional obstacles for Austria-Lichtenstein.

Border region	Socio-economic disparities	Physical obstacles (perceived difficult access)	Physical obstacles (river)	Physical obstacles (mountains)	Cultural obstacles (language)	Cultural obstacles (culture)	Cultural obstacles (trust)	Normative and institutional obstacles
Belgium-Luxembourg								
Belgium-Netherlands								
Bulgaria-Greece								
Bulgaria-Romania								
Switzerland-Germany								
Switzerland-France								
Switzerland-Italy								
Czech Republic-Germany								
Czech Republic-Poland								
Czech Republic-Slovakia								
Germany-Denmark								
Germany-France								
Germany-Luxembourg								
Germany-Netherlands								
Germany-Poland								

Border region	Socio-economic disparities	Physical obstacles (perceived difficult access)	Physical obstacles (river)	Physical obstacles (mountains)	Cultural obstacles (language)	Cultural obstacles (culture)	Cultural obstacles (trust)	Normative and institutional obstacles
Denmark-Sweden								
Estonia-Latvia								
Spain-France								
Spain-Portugal								
Finland-Norway								
Finland-Sweden								
France-Italy								
France-Luxembourg								
France-UK								
Croatia-Hungary								
Croatia-Slovenia								
Hungary-Romania								
Hungary-Slovenia								
Hungary-Slovakia								
Ireland-UK								
Italy-Slovenia								

Border region	Socio-economic disparities	Physical obstacles (perceived difficult access)	Physical obstacles (river)	Physical obstacles (mountains)	Cultural obstacles (language)	Cultural obstacles (culture)	Cultural obstacles (trust)	Normative and institutional obstacles
Lithuania-Latvia								
Lithuania-Poland								
Norway-Sweden								
Poland-Slovakia								

Table 5 – Obstacles in maritime border regions

Border region	Socio-economic disparities	Physical obstacles (perceived difficult access)	Cultural obstacles (language)	Cultural obstacles (culture)	Cultural obstacles (trust)	Normative and institutional obstacles
Belgium-UK						
Germany-Denmark						
Germany-Sweden						
Denmark-Norway						
Denmark-Poland						
Denmark-Sweden						
Estonia-Finland						
Estonia-Latvia						
Greece-						

Border region	Socio-economic disparities	Physical obstacles (perceived difficult access)	Cultural obstacles (language)	Cultural obstacles (culture)	Cultural obstacles (trust)	Normative and institutional obstacles
Italy						
Finland-Sweden						
France-Italy						
France-UK						
Croatia-Italy						
Ireland-UK						
Italy-Malta						
Latvia-Sweden						
UK-Netherlands						

Table 6 – Potentials in land border regions

Border region	Competitiveness potential (Patent applications)	Competitiveness potential (Trademark applications)	Competitiveness potential (Cultural events)	Competitiveness potential (Industrial activity)	Market integration potential (Multimodal accessibility potential)	Market integration potential (Employment)	Market integration potential (Index of employment differences)	Human and social capital (tertiary education level)	Human and social capital (internal trust)	Human and social capital (volunteerism)	Potential or integrated services for cross-border functional urban areas (cities)	Potential for integrated services in cross-border functional urban areas (coupled cities)	Potential from natural resources (Share of green, natural and protected areas)	Potential from natural resources (Number of NATURA 2000 areas)
Austria-Switzerland														
Austria-Czech Republic														
Austria-Germany														
Austria-Hungary														
Austria-Italy														
Austria-Lichtenstein														
Austria-Slovenia														
Austria-Slovakia														
Belgium-Germany														
Belgium-France														
Belgium-Luxembourg														
Belgium-Netherlands														

Collecting solid evidence to assess the needs to be addressed by Interreg cross-border cooperation programmes
(2015CE160AT044)

Border region	Competitiveness potential (Patent applications)	Competitiveness potential (Trademark applications)	Competitiveness potential (Cultural events)	Competitiveness potential (Industrial activity)	Market integration potential (Multimodal accessibility potential)	Market integration potential (Employment)	Market integration potential (Index of employment differences)	Human and social capital (tertiary education level)	Human and social capital (internal trust)	Human and social capital (volunteerism)	Potential of integrated services for cross-border functional urban areas (cities)	Potential for integrated services in cross-border functional urban areas (coupled cities)	Potential from natural resources (Share of green, natural and protected areas)	Potential from natural resources (Number of NATURA 2000 areas)
Bulgaria-Greece														
Bulgaria-Romania														
Switzerland-Germany														
Switzerland-France														
Switzerland-Italy														
Czech Republic-Germany														
Czech Republic-Poland														
Czech Republic-Slovakia														
Germany-Denmark														
Germany-France														
Germany-Luxembourg														

Border region	Competitiveness potential (Patent applications)	Competitiveness potential (Trademark applications)	Competitiveness potential (Cultural events)	Competitiveness potential (Industrial activity)	Market integration potential (Multimodal accessibility potential)	Market integration potential (Employment)	Market integration potential (Index of employment differences)	Human and social capital (tertiary education level)	Human and social capital (internal trust)	Human and social capital (volunteerism)	Potential or integrated services for cross-border functional urban areas (cities)	Potential for integrated services in cross-border functional urban areas (coupled cities)	Potential from natural resources (Share of green, natural and protected areas)	Potential from natural resources (Number of NATURA 2000 areas)
Germany-Netherlands														
Germany-Poland														
Denmark-Sweden														
Estonia-Latvia														
Spain-France														
Spain-Portugal														
Finland-Norway														
Finland-Sweden														
France-Italy														
France-Luxembourg														
France-UK														
Croatia-Hungary														
Croatia-Slovenia														
Hungary-Romania														

Collecting solid evidence to assess the needs to be addressed by Interreg cross-border cooperation programmes
(2015CE160AT044)

Border region	Competitiveness potential (Patent applications)	Competitiveness potential (Trademark applications)	Competitiveness potential (Cultural events)	Competitiveness potential (Industrial activity)	Market integration potential (Multimodal accessibility potential)	Market integration potential (Employment)	Market integration potential (Index of employment differences)	Human and social capital (tertiary education level)	Human and social capital (internal trust)	Human and social capital (volunteerism)	Potential of integrated services for cross-border functional urban areas (cities)	Potential for integrated services in cross-border functional urban areas (coupled cities)	Potential from natural resources (Share of green, natural and protected areas)	Potential from natural resources (Number of NATURA 2000 areas)
Hungary-Slovenia														
Hungary-Slovakia														
Ireland-UK														
Italy-Slovenia														
Lithuania-Latvia														
Lithuania-Poland														
Norway-Sweden														
Poland-Slovakia														

Note: for the indicators on the potential of integrated services for cross-border functional urban areas, the cells have been coloured in correspondence to the highest values (number of cities and number of coupled cities) available in the database. The same applies for the indicators on potential from natural resources based on the 25 km buffer zone data.

Table 7– Potentials in maritime border regions

Border region	Competitiveness potential (Patent applications)	Competitiveness potential (Trade mark applications)	Competitiveness potential (Cultural events)	Competitiveness potential (Industrial activity)	Market integration potential (Multimodal accessibility potential)	Market integration potential (Employment rate)	Market integration potential (Index of employment rate differences)	Human and social capital (tertiary education level)	Human and social capital (internal trust)	Human and social capital (volunteerism)	Potential of integrated services for cross-border functional urban areas (presence of cities)	Potential from natural resources (Share of green natural and protected areas)
Belgium - United Kingdom												
Germany-Denmark												
Germany-Sweden												
Denmark-Norway												
Denmark-Poland												
Denmark-Sweden												
Estonia - Finland												
Estonia - Latvia												
Greece - Italy												

Collecting solid evidence to assess the needs to be addressed by Interreg cross-border cooperation programmes
(2015CE160AT044)

Finland - Sweden												
France - Italy												
France - United Kingdom												
Croatia - Italy												
Ireland - United Kingdom												
Italy-Malta												
Latvia - Sweden												
United Kingdom-Netherlands												

Note: for the indicators on the potential of integrated services for cross-border functional urban areas, the cells have been coloured in correspondence to the highest values (number of cities) available in the database.

4.5. OVERVIEW OF BORDER OBSTACLES AND GROWTH POTENTIAL PER GROUPS OF BORDER REGIONS

Border obstacles and growth potential are further detailed through the identification of groups of border regions.

- Economic performance analysis, using GDP per capita and GDP variation from 2008 to 2013, identifies four categories: 'rich border regions' with the GDP per capita higher than the average of border regions in 2013³³; 'growing regions' with positive growth between 2008 and 2013; 'poor regions' with a GDP per capita under the border regions average, and 'decreasing regions' with negative growth.
- Demographic analysis uses population size and density in 2013 and population variation from 2008 to 2015. This analysis has the following categories: 'highly populated' with a population in 2013 higher than the average of border regions; 'less populated' with a population in 2013 lower than the of border regions average; 'high density' with more than 150 inhabitants per km²; 'low density' with less than 150 inhabitants per km²; 'growing population regions' with a positive demographic growth rate from 2008 to 2015 at NUTS3 level; 'declining population regions' with negative demographic growth³⁴.
- An analysis of EU membership of countries in the border regions uses the following sub-groups: 'borders with old Member States' including territories in EU members from before 2004; 'borders with more recent Member States', which includes territories from countries that have been EU Member States since 2004; 'mixed borders', with portions of old and recent Member States as well as non-Member States, e.g. Liechtenstein.

This analysis is based on indicators in the database and has been enriched and completed in Section 5 with statistical and econometric findings set out in detail. The analysis shows the obstacles and potentials of the groups compared to the average of all border regions. This highlights where there are more obstacles (potential) in theory for cross-border cooperation. However, it is important to underline that differences emerge within each group of border regions and within the sub-groups of maritime and land borders.

Economically growing border regions

Overall, rich (high GDP per capita) and growing border regions **have fewer obstacles than average**. Obstacles on maritime borders are socio-economic disparities and cultural obstacles in terms of lack of trust in people living on the other side of the border, in particular with Germany–Denmark, Germany–Sweden and Estonia–Finland.

Both land and maritime borders **have potential human and social capital** related to volunteerism. Investing in this resource would help address cultural obstacles that hamper social cohesion.

³³ For the three perspectives, the average value of border regions has been calculated by using the weighted average based on the population of the 25 km buffer zone area.

³⁴ The border regions can be grouped according to their population variation from 2008 to 2015. This information should be used with caution because the following borders are missing data on population development: Czech Republic–Germany, France–UK, Belgium–Germany, Germany–Poland, Hungary–Slovenia, Poland–Slovakia, Czech Republic–Poland, Germany–Netherlands, Bulgaria–Greece, Spain–Portugal, Croatia–Slovenia, Austria–Slovenia, and Italy–Slovenia for land borders and Belgium–UK, Germany–Denmark, Netherlands–UK, Germany–Sweden, Denmark–Poland, Greece–Italy and France–UK for the maritime borders. The remaining borders are separated in two groups: growing borders when the population increased from 2008 to 2015, declining borders when the population decreased from 2008 to 2015. There are 31 growing regions and 11 are declining.

The potential of integrated services for cross-border functional urban areas is related to coupled cities. The rich and growing land border regions are in Central and Northern Europe: Belgium–Netherlands, Switzerland–Germany, Germany–France, Germany–Luxembourg, Germany–Netherlands, Denmark–Sweden.

High GDP and low GDP border regions

The main obstacles in rich and poor border regions, growing and decreasing, maritime and land, are socio-economic disparities, physical obstacles and cultural obstacles. However, rich and poor border regions differ substantially in terms of growth potential.

Competitiveness potential in rich regions is related to specific resources such as cultural and industrial activities. Here growth potential for human and social capital is associated with volunteerism. For market integration, the opportunities come from cross-border labour market integration and multimodal accessibility.

Competitiveness potential in land and maritime borders and poor and growing borders rely on resources such as patents, product innovation and cultural activities. Market integration potential is mainly related to multimodal accessibility, while human capital and social capital are related to the education level. Poor declining maritime borders also have a 'competitiveness potential' that comes from industrial activity.

The potential for integrated services in cross-border functional urban areas is related to coupled cities. In addition to the rich and growing land border regions identified above, there are also the rich and decreasing Switzerland–Italy and Switzerland–France regions.

In the sub-set of poor regions, five border regions have coupled cities. One is a poor but growing border region (Bulgaria–Romania) and four are declining: Belgium–France, Czech Republic–Poland, Spain–France, France–Italy.

Highly-populated border regions

This category includes six border regions with high density and two with low density. There are four high-density land border regions Belgium–France, Belgium–Netherlands, Germany–France, Germany–Netherlands and two maritime, Belgium–UK and France–UK. Highly-populated border regions with low density include two maritime border regions: Germany–Denmark and Denmark–Sweden. Socio-economic disparities, physical obstacles and cultural obstacles are the main obstacles for maritime regions, while normative and institutional obstacles are common to both land and maritime regions with high density.

Competitiveness potential in the border regions comes from investment in productive innovation for land border regions, e.g. trademark applications and industrial and cultural activities for maritime border regions. Potential is also related to labour market integration in regions with high density since the employment rate varies across borders. Moreover, potential in human and social capital is related to

volunteerism in land and maritime border regions, e.g. Germany-Denmark and Denmark-Sweden.

The potential for integrated services in cross-border functional urban areas is related to coupled cities in the land border regions Belgium-France, Belgium-Netherlands, Germany-France, Germany-Netherlands.

Less-populated border regions

This category includes high and low density. Less-populated high density border regions include four borders: two land borders: Switzerland-Germany and Denmark-Sweden and two maritime borders: Greece-Italy and Italy-Malta. The two land borders plus Italy-Malta had population growth from 2008 to 2013. The main obstacles for both land and maritime borders are cultural, normative and institutional. However, land borders also have socio-economic disparities, while the maritime border regions have physical obstacles.

Both types of borders have competitiveness potential, e.g. patents, trademarks, cultural events, industrial activity and market integration potential, e.g. multimodal accessibility and cross-border labour market and human and social capital potential, e.g. tertiary education. The two land border regions have high potential for competitiveness in industrial activity and human and social capital with volunteerism.

The subset of less-populated border regions with low density encompasses 52 land and maritime borders. The most common shared need is less evident than for the other categories because of the diversity of border regions in this category.

For maritime regions, two obstacles are perceived to be common to less-populated and low density areas, namely socio-economic disparities and physical obstacles. One clear common potential is shared by 20 less-populated, low density land borders: human and social capital in terms of tertiary education. Most maritime borders share competitiveness, with low industrial activity and market integration, in terms of multimodal accessibility.

The potential for integrated services in cross-border functional urban areas is related to coupled cities. Less populated land border regions with high density are Switzerland-Germany and Denmark-Sweden. Those with low density are Bulgaria-Romania, Switzerland-France, Switzerland-Italy, Czech Republic-Poland, Germany-Luxembourg, Spain-France and France-Italy.

Borders between old Member States

These have fewer obstacles than the border region average. The most recurring obstacle is normative and institutional barriers, even among older Member States,

while growth and development in maritime borders is mainly hindered by physical accessibility and cultural obstacles.

Growth potential comes from investments in industrial activities, labour market integration to harmonise differences in employment rates across borders and the full exploitation of the presence of cities, which can be used in a cross-border network to develop and deliver integrated services.

Borders between recent Member States

Both maritime and land border regions face cultural obstacles. Some land borders have both rivers and mountains as physical obstacles, i.e. Croatia-Slovenia and Hungary-Slovakia, while the Estonia-Latvia maritime border area has socio-economic disparities.

Competitiveness potential relies on investment in knowledge production, e.g. patents and product innovation, e.g. trademarks, while market integration potential is related to strengthening multimodal accessibility across the borders. Some border regions can fully benefit from cities across the border to develop and deliver integrated services, notably Bulgaria-Romania, and Czech Republic-Poland. Growth potential from human and social capital relates to the level of tertiary education.

The Estonia-Latvia maritime border has competitiveness potential related to knowledge production (e.g. patent applications), product innovation and industrial activity. Market integration potential is related to strengthening multimodal accessibility and cross-border labour market opportunities. The potential from human and social capital relies on volunteerism. Due to the high endowments of natural and protected areas, the Estonia-Latvia border area shows high potential for shared management of natural resources.

Regions with mixed borders

Socio-economic disparities are the main obstacles in both maritime and land borders. For land borders, there are also cultural obstacles such as language and cultural differences in particular but also a lack of trust, and normative and institutional differences. In the maritime borders, three out of six have high perceived difficult accessibility and cultural obstacles, due to a lack of trust.

Overall, socio-economic disparities are high when there is a EU15 Member State bordering another type of country, with the exception of the land border regions Norway-Sweden, Austria-Slovakia, and maritime regions Italy-Malta and Denmark-Norway. All land border regions have high language barriers, with the exception of all Swiss regions³⁵ and the Scandinavian border of Norway and Sweden. Cultural barriers

³⁵ Since the Swiss federal system has a linguistic base.

are perceived high obstacles to cross-border cooperation when Italy, France and Germany have borders with other countries and when Austria borders Slovakia and the Czech Republic, and in eastern Europe between Greece and Bulgaria. Normative and institutional obstacles are identified in maritime borders, e.g. Latvia-Sweden, Estonia-Finland, Denmark-Poland, and Denmark-Norway, and land borders, all those including Switzerland, when Austria borders Slovakia, Hungary, Switzerland and the Czech Republic, and Italy-Slovenia, Germany-Czech Republic, Germany-Poland.

For both land and maritime borders, the potential for human and social capital relies on volunteerism, which could address the cultural and institutional obstacles mentioned above and be a way to fully utilise green and protected areas in the border regions. Competitiveness potential is related to cultural events for land borders and to knowledge production and productive innovation for maritime ones. Strengthening multimodal accessibility can increase market integration and address perceived and tangible physical obstacles. The potential for integrated services for cross-border functional urban areas is concentrated in regions including Switzerland, where there are at least two coupled cities, such as the Switzerland-Germany, Switzerland-France and Switzerland-Italy border regions. The cities in these regions may be drivers of cross-border integration, addressing the border obstacles.

Growing population regions

Growing land border regions have two main obstacles: socio-economic disparities and normative and institutional obstacles. Land borders that face these two obstacles are Austria-Hungary, Austria-Czech Republic, Switzerland-Italy, Belgium-Luxembourg, Switzerland-Germany, Germany-Luxembourg, France-Luxembourg and Switzerland-France. The situation is different for maritime regions because no common major obstacle is shared among the eight borders. By analysing common potential in land and maritime border regions, both types of borders share human and social capital potential related to volunteerism. A total of 16 borders share volunteerism as a potential: Belgium-Netherlands, Austria-Slovakia, Czech Republic-Slovakia, Norway-Sweden, Austria-Switzerland, Denmark-Sweden, Austria-Hungary, Austria-Czech Republic, Switzerland-Germany, Germany-Luxembourg, France-Luxembourg, Austria-Lichtenstein for the land borders and Estonia-Finland, Denmark-Sweden, Denmark-Norway and Finland-Sweden for maritime borders. Moreover, the maritime borders also share market integration, in terms of multimodal accessibility.

The potential for integrated services in cross-border functional urban areas is related to coupled cities. Growing land border regions are Belgium-Netherlands, Bulgaria-Romania, Switzerland-Germany, Germany-France, Germany-Luxembourg, Germany-Netherlands, Denmark-Sweden.

Declining population regions

Declining land border regions have a common obstacle: lack of trust. Five out of nine borders share this cultural obstacle: Bulgaria–Romania, Hungary–Romania, Lithuania–Poland, Lithuania–Latvia and Estonia–Latvia. The two declining maritime borders, namely Estonia–Latvia and Latvia–Sweden, have common obstacles with socio-economic disparities, physical and cultural obstacles. Regarding potential, both maritime and land borders have the same types of potential, namely competitiveness, with patent and trademark applications, and market integration related to multimodal accessibility. Moreover, the human and social capital potential for tertiary education and high employment is only shared by land border regions. The two maritime borders have human and social capital potential related to volunteerism, competitiveness related to industrial activity and natural resources linked to green and protected areas.

The potential for integrated services in cross-border functional urban areas is related to coupled cities. Decreasing land border regions are Belgium–France and France–Italy.

5. OPPORTUNITIES TO INTERVENE IN BORDER REGIONS

This section uses a set of econometric estimates to identify the appropriate types of interventions in each of the 62 border regions.

- Firstly, the research team analysed the relevance of socio-economic resources, in terms of the socio-economic growth generated by a specific resource in border regions.
- Secondly, the research team analysed compensation effects from the capacity to tap into other regions' resources.
- Finally, there are conclusions on the opportunities to intervene by resource and type of border region.

5.1. RESOURCES FOR GROWTH: ENDOWMENT NEEDS AND EFFICIENCY NEEDS

Up to now, potential has been interpreted as a lack of resources³⁶. In abstract terms, in fact, an economic resource with a low endowment can demonstrate growth potential in the area. However, if a resource has a low endowment, it is actually an obstacle to the growth of a region only when the resource is **strategic** for the growth of the local economy. In this case, the fact that it is underutilised is a real detriment as regards regional development.

The methodology identifies three types of resources:

Resources with high relevance that significantly affect socio-economic growth in border regions. Growth in border regions is particularly stimulated by increasing human capital (measured by population with tertiary education) and product innovation (measured with trademark applications) In this case, the fact that these strategic resources have a low endowment corresponds to an **actual endowment need**.

Resources with moderate relevance. This is the situation where resources are strategic but not fully tapped due to the border. The border and the lack of strategic resources can hamper growth, resulting in an **efficiency need**³⁷ and **actual endowment need**. When economic growth suffers from an inefficient use of resources, there is a need for 'soft' intervention in capacity building and policy integration, networking and cooperation between institutional levels to reinforce bilateral trust. Untapped resources due to the border hinder growth potential in competitiveness (see the maps in Annex 3).

The relatively lower growth generated by these untapped resources differs among borders. Most southern borders suffer from inefficient exploitation of cultural events³⁸, which is not the case for northern borders. With the exception of Finland-Norway and the France-UK border. Southern borders are usually highly endowed with cultural events but suffer from relatively high economic loss due to inefficient use of these cultural events. In contrast, northern borders suffer from a lack of cultural events, but use them better to stimulate economic growth (see maps in Annex 3).

36 Share of natural resources is an exception. Here, the potential is in shared management across the border, and the need is the lack of shared management.

37 An efficiency need is quantified through statistical analysis estimating the loss of socio-economic cohesion due to an untapped (or not fully tapped) resource. See Annex 4 for the methodology.

38 Cultural events refer as a proxy to cultural sectors and activities

Resources with low relevance have a limited effect on socio-economic growth in border regions. These resources include the creation of pure knowledge, (measured through patent applications), high demographic density and accessibility. These results can be interpreted as follows. In order to generate growth, knowledge creation requires the capacity to turn new knowledge into a marketable product. Urban density generates a low return to growth, which is indicated as an average result between the positive and negative effects on the local economies of cities of varying sizes.

Table 8 - Relevance of resources for socio-economic growth (with related potential).³⁹

High	Moderate (due to untapped resources)	Low (not strategic)
Education level (Social and human capital)	Cultural activities (Competitiveness)	Knowledge creation (Competitiveness)
Product innovation (Competitiveness)	Industrial activities (Competitiveness)	Urban density (Integrated services for cross-border functional urban areas)
	Saving propensity*	Accessibility (Market integration potential)
	Trust (Social and human capital)	
	Volunteerism (Social and human capital)	

* Not suitable for CBC programme

³⁹ See Annex 4 for the methodology.

5.2. LACK OF COMPENSATION EFFECTS: UNTAPPED RESOURCES OF OTHER REGIONS

Regions having less resources resource may exploit other regions' resources, and thus compensate for the lack or the inefficient exploitation of internal resources. When this capacity is lacking, a loss of economic growth or social cohesion takes place. This situation can be defined as a 'lack of compensation' effect.

The lack of compensation effect varies among borders. For cultural activities, most northern borders compensate by exploiting cultural events in nearby regions. The UK-France border, for example, shows a high loss of economic growth due to poor exploitation of their cultural activities, but it compensates by exploiting cultural events from other regions. Proximity to highly attractive tourist centres like London and Paris also generates growth opportunities for the UK-France border area. Most southern border areas, such as Italy-Slovenia and France-Spain, where cultural activities are inefficiently exploited, take limited advantage of events in other regions (see maps in Annex 3).

5.3. DEGREE OF OPPORTUNITY TO INTERVENE AT BORDER REGION LEVEL

The previous analysis is used to identify opportunities to intervene and the types of intervention required, based on the different types of resources in border regions.

Situations include (Table 9):

- borders with 'no opportunity to intervene', because they are highly endowed with a tapped economic asset. For instance, a border region hosts a popular, famous museum, attracting tourists from all over the world. In terms of opportunity of intervention, it has a value of 0, since no needs are anticipated (case a in Table 9);
- borders with an 'opportunity to intervene to increase the resource', because they are poorly endowed with a particular economic asset, but this is efficiently tapped. For instance, a border area with a small museum, which hosts many exhibitions, with long opening hours. An investment in increasing the endowment of the local resource may be worthwhile even if the resource is already well exploited. This has a value of 1 (case b in Table 9);
- borders with an 'opportunity to intervene in governance and management of resources', because they are highly endowed with an economic asset, but this is untapped due to the border. This could be a large museum, with few exhibitions and restricted opening hours. These borders represent areas where it is worthwhile investing, by intervening in the governance and management of the resource. A value of 2 is assigned to this category. Compared to case b, there is more opportunity to intervene in the management and governance rather than in the endowment of the resources (case c in Table 9);
- border regions with an 'opportunity to intervene in both governance and management and increase resources', because they are poorly endowed with an inefficiently exploited economic asset. This is the case of a border region with a small museum with limited exhibitions and restricted opening hours. A value of 3 is assigned to the opportunity to intervene in these areas for that particular resource (case d in Table 9).

If the border area is able to compensate for its lack of resources (or inefficient management) through the exploitation of others' resources, the intervention opportunities fall to 0.

Table 9 - Degree of opportunity to intervene on specific development assets and type of intervention

Efficiency needs [§]		
	Lower-than-average efficiency needs	Higher-than-average efficiency needs
Actual endowment needs [§]		
Lower-than-average endowment needs	Case a: 0	Case c: 2 * (intervention on governance)
Higher-than-average endowment needs	Case b: 1 * (intervention on endowment)	Case d: 3 * (both types of intervention)

Legend, opportunity to intervene: 0 = none, 1 = low, 2 = medium, 3 = high.

§ Actual endowment needs = lack of a useful resource; efficiency needs = untapped useful resources.

* When the region compensates for its inefficiency by exploiting other regions' resources, the opportunity to intervene falls to 0.

5.4. OPPORTUNITY TO INTERVENE BY BORDER AREA

General overview

- Overall, borders seem to require either no intervention, or both types of intervention. Thus they are highly differentiated in terms of their needs and related intervention opportunities.
- The share of border areas with the opportunity to intervene in both governance and an increase in resources is especially high for soft social assets, namely trust and volunteerism.
- A relatively high share of border regions can intervene in governance for industrial and cultural activities. This kind of intervention is particularly affordable for Interreg programmes.
- Very few borders call for intervention on endowment for all types of resources, indicating that most development issues in these areas highlight integration challenges,

rather than pure endowment ones. Intervention in the governance of resources is the most urgent aspect to promote economic and social cohesion in these areas.

Land border areas

Land border areas reflect the profile of border areas in general (see maps in Annex 3).

As regards economic resources:

- for 'industrial activities', the opportunity to intervene in governance is mainly concentrated on the Germany-Poland, Italy-Switzerland, Germany-Czech Republic and Hungary-Romania border areas. Opportunities to intervene in both endowment and governance typically occurs at southern land borders, e.g. Spain-Portugal, Spain-France, Greece-Romania;
- for 'cultural activities', most southern countries suffer from efficiency needs, and intervention in the governance would promote better use of resources. Northern and eastern countries show no need at all for this economic asset.

For social resources, the situation is quite different. While a lack of trust calls for intervention in the Switzerland-Germany; Switzerland-France; and Germany-Austria border areas (see Annex 3), there are opportunities to promote volunteerism all across Europe (see Annex 3).

Maritime border regions

- Many maritime borders do not require intervention. Those requiring both investment and governance intervention are split into two groups. Firstly, maritime regions show that their industrial activities suffer more of an efficiency need than an endowment need. Industrial activities, like harbour activities, call for rejuvenation, a re-launch and integration of their role in local economies rather than an enlargement of their structure. This is especially true in the Italy-Slovenia, Italy-Croatia and Poland-Germany border areas (see Annex 3).
- For cultural activities, intervention on governance is concentrated in southern maritime areas, while northern maritime areas, with the exception of UK-Ireland, show no opportunity to intervene (see Annex 3).
- Finally, opportunity to intervene in both investments and governance on 'soft' elements for social cohesion is highlighted in the France-UK and UK-Ireland border areas (see Annex 3).

5.5. OPPORTUNITY TO INTERVENE BY CATEGORY OF BORDER AREA

Growing regions

In fast-growing areas, economic issues are much less important, which suggests that the borders in these areas do not prevent them from exploiting resources efficiently. This, however, takes place at the expense of social cohesion, suggesting intervention for social capital, especially intervention on governance.

Rich regions

Rich areas suffer from trust endowment needs, confirming the same opportunity to intervene as for fast-growing ones. In addition, their economic resources (and in particular industrial activities and saving propensity) tend to suffer slightly more from efficiency needs, calling for governance intervention.

The figure below shows the border areas in the four intervention classes by demographic type. Interesting demographics are declining population and high-density areas.

Declining population areas

Areas where population has been shrinking in recent years have limited trust issues; their social capital is a major asset for internal social cohesion. However, they tend to suffer from economic problems, which have most likely caused the population decline. Finally, a declining population is usually associated with a growing share of elderly people, justifying intervention on endowment as well as on efficiency for volunteerism (typically highest among the young).

Figure 2 - Opportunity to intervene by type of resource: percentage of borders falling into each category of intervention

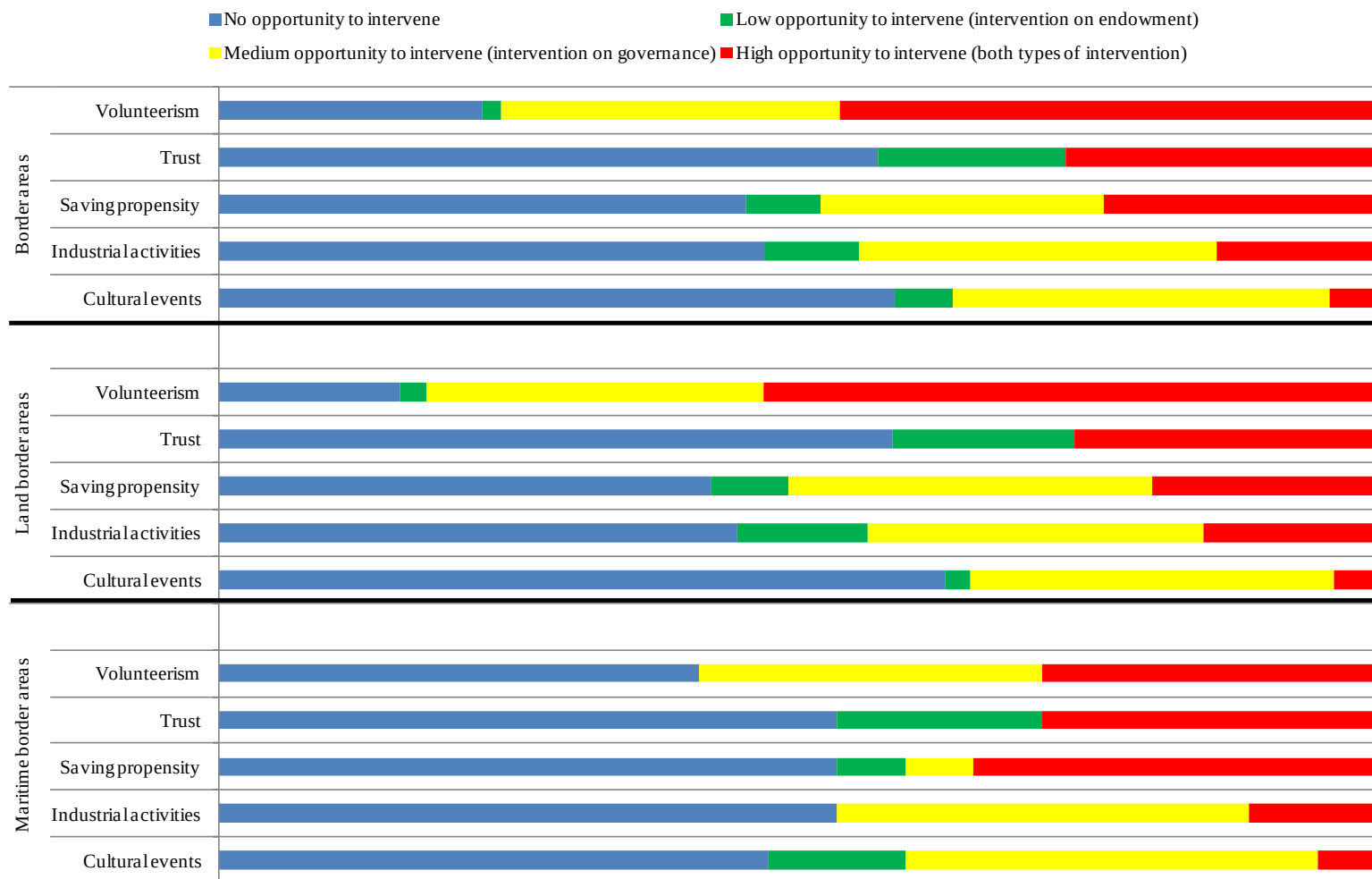


Figure 3 - Opportunity to intervene: percentage of fast-growing and rich borders falling into each category of intervention

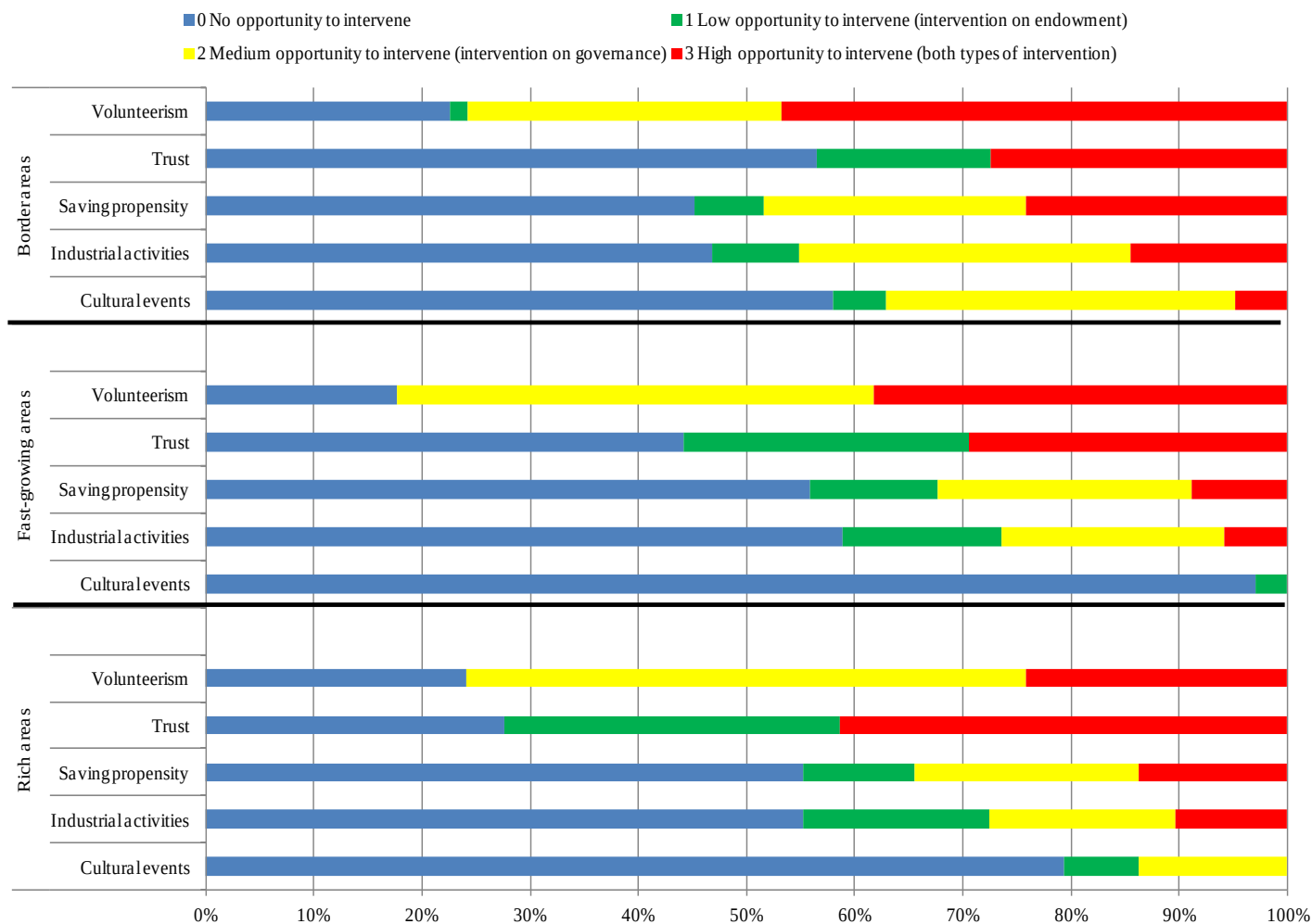
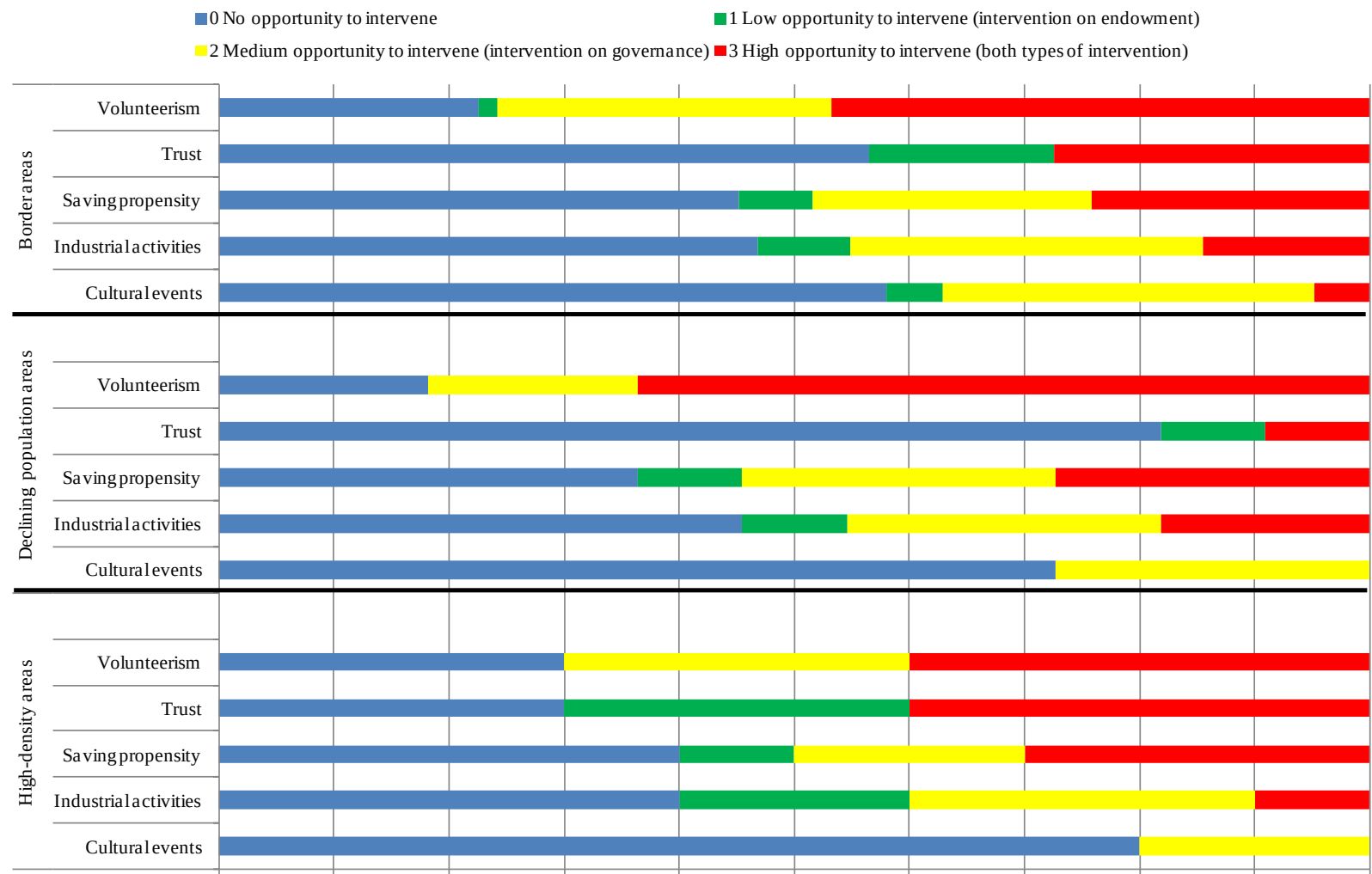


Figure 4 - Opportunity to intervene: percentage of declining population and densely populated borders falling into each category of intervention



5.6. CONCLUSIONS SECTION 5

- Border regions, especially maritime ones, tend to suffer more from efficiency rather than endowment needs. Therefore, governance intervention, i.e. on 'soft' elements reinforcing integration and cooperation are more pressing than investments in resources.
- There is a high degree of heterogeneity within border regions, with markedly different needs that call for specific ways of addressing them.
- Fast-growing areas clearly have fewer economic problems. However, areas with these problems would benefit from interventions targeting social cohesion in terms of endowment, as well as the efficient use of resources.
- Rich borders require limited intervention in economic resources, but need policies targeting social cohesion. For social resources, intervention in governance and endowment is required.
- Areas where the population has been declining in recent years clearly require major policy interventions both in terms of investment (endowment) as well as in terms of governance for most economic characteristics, which are most likely the cause of the demographic decline.

Finally, dense urban areas, which suffered the most during the recent economic crisis, would benefit from policies stimulating economic growth.

6. NEW DATA SOURCES TO QUANTIFY THE NEEDS

This section proposes cross-border indicators that are not yet available or partially available, to complete the quantification of needs identified in section 3.

The list of indicators has been identified based on an initial gap analysis, considering the needs defined in section 2 and the indicators illustrated in section 3.

New indicators have been proposed based on the gap analysis, because:

- needs in the database are partially quantified, i.e. only based on 'perception';
- available indicators in the database are proxy in nature, meaning that the quantification of needs is indirect, e.g. 'unemployment rates' in measuring 'market integration';
- information is not provided at a suitable scale; e.g. lack of information at buffer zone level;
- a new source of information is available but not yet fully exploited, e.g. 'big data'.

Indicators are listed below:

- totally new indicators, for which a methodology has to be developed and data collected across the EU's cross-border regions;
- already existing indicators, for which the methodology needs to be adapted within a CBC framework and/or the territorial coverage of current data has to be extended in order to cover all the cross-border regions (also taking into account the requirement for information at the 25 km buffer zone);
- indicators that need an update, i.e. methodology and data are available but a new survey is necessary to provide updated information.

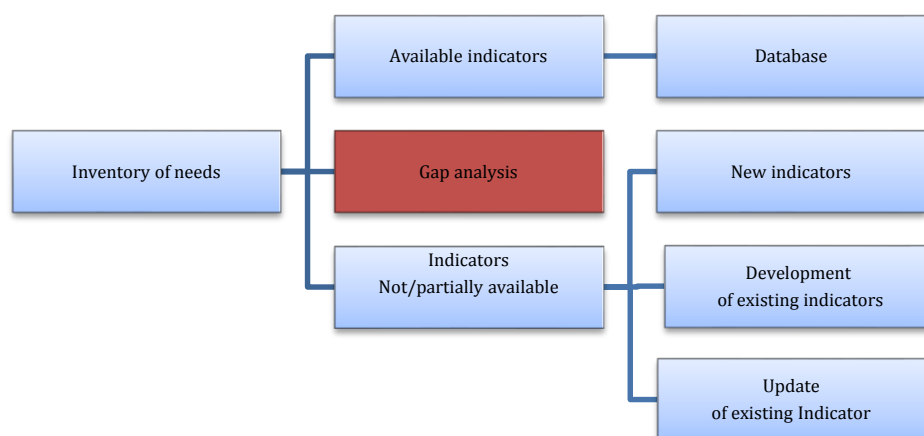


Table 14 below illustrates the most important proposed indicators resulting from the gap analysis conducted and Annex X provides the full list of indicators describing border needs, which are partly, or completely missing. In addition to these, the indicators existing in the database should be updated. In particular, it is essential that indicators based on the Eurobarometer survey concerning barriers related to language⁴⁰, trust⁴¹, cultural⁴² and legal and administrative structure⁴³ be updated and expanded in order to provide statistically significant results at NUTS3 level.

The existing indicators in the database relating to physical obstacles are either based on perception or geographical barriers such as mountain or rivers. Since these types of indicators are indirect/based on perception, and there are possibilities to develop objective indicators that take into account infrastructure, two additional indicators are proposed: (a) , taking into account the number and types of roads crossing the border; and (b) identification of traffic bottlenecks in public transport along the border.

The first one is an entirely new indicator, whereas the second one was already developed in a pilot project in the Sweden-Denmark border region. The pilot project only concerns rail traffic, but could also be developed in order to capture all public transport services.

As regards needs related to normative and institutional obstacles, more objective data must be found to supplement the perception indicators based on Eurobarometer questions. The primary suggestion provided below is to develop a new indicator, based on a survey, which measure the number of cross-border agreements between institutions.

The area of market integration potential has objective data. However, more pertinent indicators can be developed by using new data sources, which more directly measure the market integration potential. The proposal below is to build a new indicator which, based on web search engines, estimates the number of searches for job offers across the border in order to measure the potential flow of a labour force across borders.

Finally, the need related to potential of integrated services for cross-border functional urban areas is currently only measured indirectly in the database.

⁴⁰ Eurobarometer survey 422, 2015 - Question 6.3: "Thinking about the cooperation between [our country] and [country from programme], to what extent is language difference a problem?"

⁴¹ Eurobarometer survey 422, 2015 - Question 3T1: "Would you personally feel comfortable or uncomfortable about having a citizen from a neighbouring country as your neighbour/ work colleague/ family member/ manager?"

⁴² Eurobarometer survey 422, 2015 - Question 6.5: "Thinking about the cooperation between [our country] and [country from programme], to what extent are cultural differences considered a problem?"

⁴³ Eurobarometer survey 422, 2015 - Question 6.1 "Thinking about the cooperation between [our country] and [country from programme], to what extent are legal or administrative differences considered problems?"

Therefore, the proposal is to develop a new indicator with the precise location of a number of services, e.g. amenities, emergency services, leisure, sport facilities, etc. based on open-source software or commercial alternatives.

Table 10 - New indicators of border needs related to prioritised needs

Category of need	New indicator	Type of methodological development	Cost of development	Source of data and/or methodological development
Physical obstacles	Number and types of roads crossing the border, using road network data	New indicator The indicator does not exist as such, but it can be developed by extracting free data on types of roads: motorway, trunk, primary, secondary.	Low	Openstreetmap.org
	Identification traffic bottlenecks in public transport along the border	Existing indicator but development is needed The creation of this indicator requires both the collection of existing data and the development of missing data using the same methodology.	Moderate	Pilot conducted in the Öresund region, see http://www.orestat.se/sites/all/files/tillg%C3%A4nglighetsatlas_se_webb.pdf .
Normative and institutional obstacles	Number of cross-border agreements between institutions	New indicator Methodological development is needed in terms of typology of agreement and institutions to be included in the sample for a survey.	High	New survey needed

Market integration potential	Number of searches for job offers across the border using data from web search engines	New indicator It is possible to collect data on job offers. However, there is no satisfactory way to do so yet. Hence, the need is to find the best modelling tool for collecting the data.	Moderate to high	Big data team, Eurostat
Potential of integrated services for cross-border functional urban areas	Location of urban service with open source map software or commercial alternatives. Indicate the precise location of a number of services, e.g. amenities, emergency services, leisure, sport facilities, etc.	New indicator Some data exists thanks to the contribution of active users of open source software. However, the data quality differs from one region to the other, hence a need to quality check the existing data. Aggregation to NUTS3 level is also needed. The constant update of information should also be taken into consideration when developing the method to extract the data.	Moderate to high	Openstreetmap.org

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397	Consumer attitudes towards cross-border trade and consumer protection	April 2014
396	Retailers' attitudes towards cross-border trade and consumer protection	March 2014
422	Cross-border cooperation in the EU	June 2015
332	Consumer attitudes towards cross-border trade and consumer protection	September 2011
299	Consumer attitudes towards cross-border trade and consumer protection	September 2010
2010.2	Qualitative survey about cross-border mobility	June 2010
210	Cross-border health services in the EU	May 2007

8. ANNEXES

- Annex 1: List of border regions by characteristics
- Annex 2: Maps illustrating finding of section 4
- Annex 3: Additional graphic maps and visual representations of section 5
- Annex 4: Methodology of section 5
- Annex 5: Proposal for new indicators
- Annex 6: List of stakeholders involved in the study

ANNEX 1: LIST OF BORDER REGIONS BY CHARACTERISTICS

This Annex contains the table describing the features of the border regions according to the categorisation proposed in section 4.

Table 11 - Groups of border regions (land)

Label	Type of border	GDP	GDP growth	Population	Density	Pop variation (2008-2015)	Date of membership
Austria - Switzerland	Land	rich	growing	Less populated	low density	growing	mixed border
Austria - Czech Republic	Land	poor	growing	Less populated	low density	growing	mixed border
Austria - Germany	Land	rich	growing	Less populated	low density	growing	before 2004
Austria - Hungary	Land	rich	growing	Less populated	low density	growing	mixed border
Austria - Italy	Land	rich	growing	Less populated	low density	growing	before 2004
Austria - Lichtenstein	Land	rich	growing	Less populated	low density	growing	mixed border
Austria - Slovenia	Land	poor	decreasing	Less populated	low density	n.a.	mixed border
Austria - Slovakia	Land	rich	growing	Less populated	low density	growing	mixed border
Belgium - Germany	Land	poor	growing	Less populated	low density	n.a.	before 2004
Belgium - France	Land	poor	decreasing	Largely populated	high density	growing	before 2004
Belgium - Luxemburg	Land	rich	growing	Less populated	low density	growing	before 2004
Belgium - Netherlands	Land	rich	growing	Largely populated	high density	growing	before 2004
Bulgaria - Greece	Land	poor	decreasing	Less populated	low density	n.a.	mixed border
Bulgaria - Romania	Land	poor	growing	Less populated	low density	decreasing	after 2004
Switzerland - Germany	Land	rich	growing	Less populated	high density	growing	mixed border
Switzerland - France	Land	rich	decreasing	Less populated	low density	growing	mixed border
Switzerland - Italy	Land	rich	decreasing	Less populated	low density	growing	mixed border

Czech Republic - Germany	Land	poor	growing	Less populated	low density	n.a.	mixed border
Czech Republic - Poland	Land	poor	decreasing	Less populated	low density	n.a.	after 2004
Czech Republic - Slovakia	Land	poor	growing	Less populated	low density	growing	after 2004
Germany - Denmark	Land	rich	growing	Less populated	low density	decreasing	before 2004
Germany - France	Land	rich	growing	Largely populated	high density	decreasing	before 2004
Germany - Luxemburg	Land	rich	growing	Less populated	low density	growing	before 2004
Germany - Netherlands	Land	rich	growing	Largely populated	high density	n.a.	before 2004
Germany - Poland	Land	poor	growing	Less populated	low density	n.a.	mixed border
Denmark - Sweden	Land	rich	growing	Less populated	high density	growing	before 2004
Estonia - Latvia	Land	poor	growing	Less populated	low density	decreasing	after 2004
Spain - France⁴⁴	Land	poor	decreasing	Less populated	low density	growing	before 2004
Spain - Portugal	Land	poor	decreasing	Less populated	low density	n.a.	before 2004
Finland - Norway	Land	rich	growing	Less populated	low density	growing	mixed border
Finland - Sweden	Land	rich	growing	Less populated	low density	decreasing	before 2004
France - Italy	Land	poor	decreasing	Less populated	low density	growing	before 2004
France- Luxemburg	Land	rich	decreasing	Less populated	low density	growing	before 2004
France - UK	Land	poor	decreasing	Less populated	low density	n.a.	before 2004

⁴⁴ Include Andorra

Croatia - Hungary	Land	poor	decreasing	Less populated	low density	decreasing	after 2004
Croatia - Slovenia	Land	poor	decreasing	Less populated	low density	n.a.	after 2004
Hungary - Romania	Land	poor	decreasing	Less populated	low density	decreasing	after 2004
Hungary - Slovenia	Land	poor	decreasing	Less populated	low density	n.a.	after 2004
Hungary - Slovakia	Land	poor	decreasing	Less populated	low density	growing	after 2004
Ireland - UK	Land	poor	decreasing	Less populated	low density	growing	before 2004
Italy - Slovenia	Land	poor	decreasing	Less populated	low density	n.a.	mixed border
Lithuania - Latvia	Land	poor	growing	Less populated	low density	decreasing	after 2004
Lithuania - Poland	Land	poor	growing	Less populated	low density	decreasing	after 2004
Norway - Sweden	Land	rich	growing	Less populated	low density	growing	mixed border
Poland - Slovakia	Land	poor	growing	Less populated	low density	n.a.	after 2004

GDP: Rich if GDP per capita is higher than the border regions weighted average / Poor if GDP per capita is lower than the border regions weighted average

GDP growth (with limits in data availability): Growing if GDP growth is higher than 0 / Declining if GDP growth is lower than weighted average

Population (at 25 km buffer zone level): Largely populated if population is higher than weighted average / Less populated if population is lower than weighted average

Density (at 25 km buffer zone level): Low density when the density is lower than 150 inhabitants per kilometre square / High density in the other cases

Pop variation (at Nuts-3 level with limits in data availability): Decreasing if population has decreased / Growing if population has increased

Date of Membership: Before 2004 if both countries in the border region became EU Member States before 2004 / After 2004 if both countries in the border region became EU Member States after 2004 / Mixed regions where various types of borders are included as external borders and EU-15/EU-25 borders, etc.

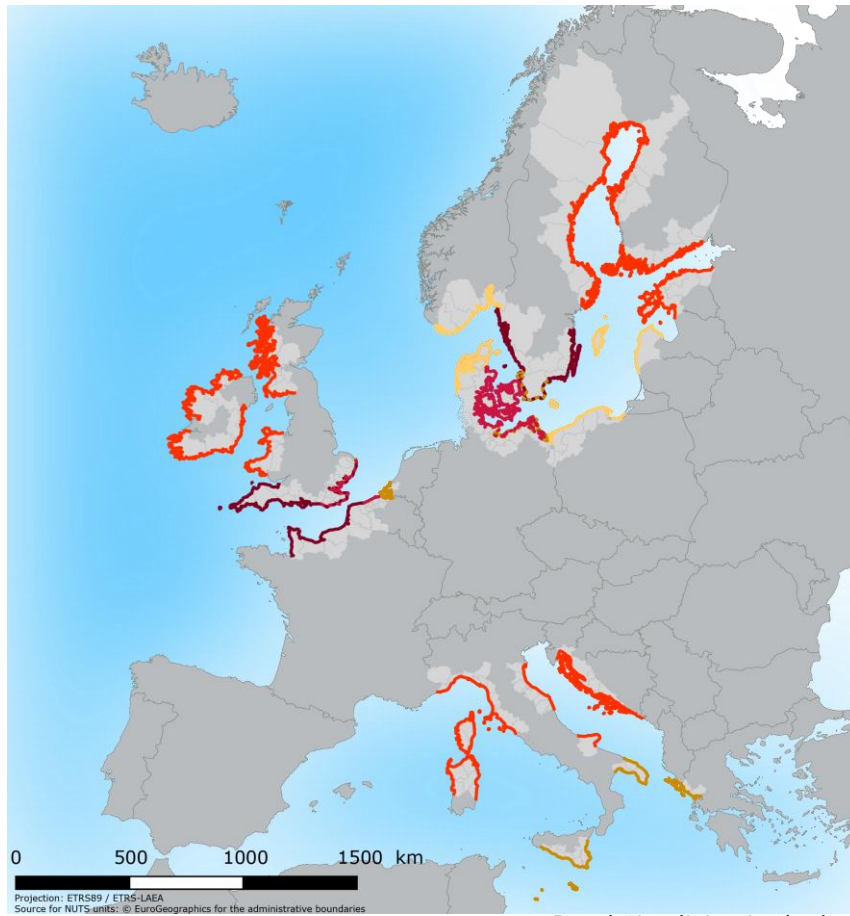
Table 12 - Groups of border regions (maritime)

Label	Type of border	GDP	GDP growth	Population	Density	Pop variation (2008-2015)	Date of membership
Belgium - UK	Maritime	poor	decreasing	Largely populated	high density	n.a.	before 2004
Germany - Denmark	Maritime	rich	growing	Largely populated	low density	n.a.	before 2004
Germany - Sweden	Maritime	rich	growing	Less populated	low density	n.a.	before 2004
Denmark - Norway	Maritime	rich	growing	Less populated	low density	growing	mixed border
Denmark - Poland	Maritime	poor	decreasing	Less populated	low density	n.a.	mixed border
Denmark - Sweden	Maritime	rich	growing	Largely populated	low density	growing	before 2004
Estonia - Finland	Maritime	rich	growing	Less populated	low density	growing	mixed border
Estonia - Latvia	Maritime	poor	growing	Less populated	low density	decreasing	after 2004
Greece - Italy	Maritime	poor	decreasing	Less populated	high density	n.a.	before 2004
Finland - Sweden	Maritime	rich	growing	Less populated	low density	growing	before 2004
France - Italy	Maritime	poor	decreasing	Less populated	low density	growing	before 2004
France - UK	Maritime	rich	decreasing	Largely populated	high density	n.a.	before 2004
Croatia - Italy	Maritime	poor	decreasing	Less populated	low density	growing	mixed border
Ireland - UK	Maritime	rich	decreasing	Less populated	low density	growing	before 2004
Italy - Malta	Maritime	poor	decreasing	Less populated	high density	growing	mixed border
Latvia - Sweden	Maritime	poor	decreasing	Less populated	low density	decreasing	mixed border
Netherlands - UK	Maritime	rich	decreasing	Less populated	low density	n.a.	before 2004

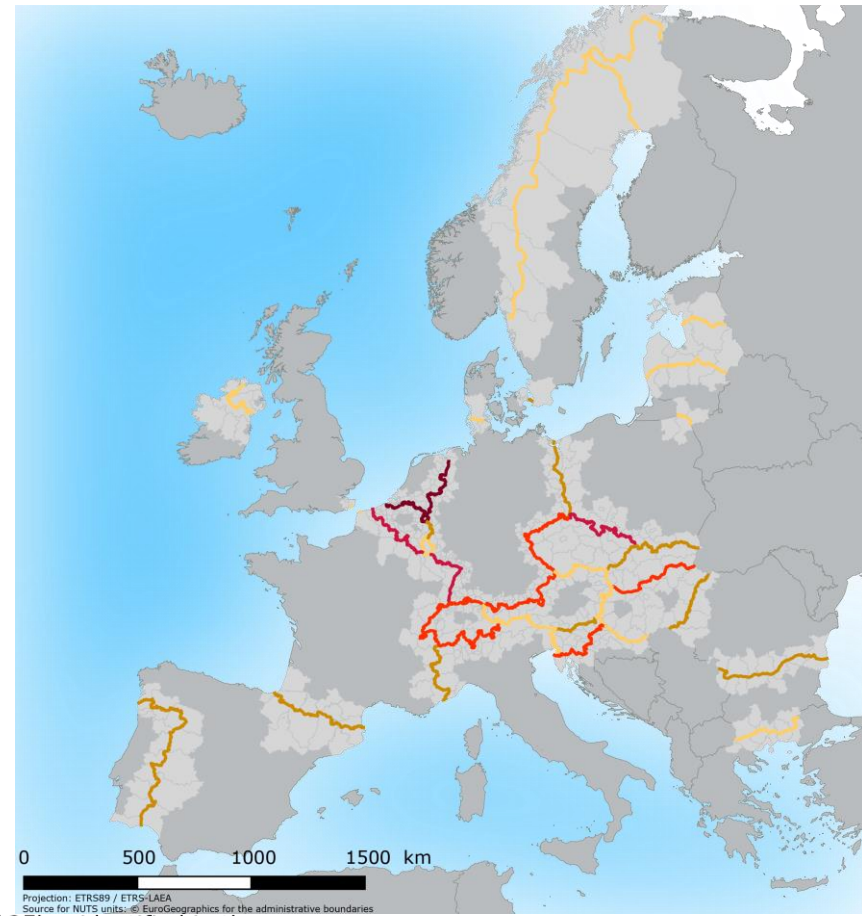
ANNEX 2: ADDITIONAL MAPS (SECTION 4)

This Annex reports additional figures illustrating the findings of section 4.

Map 7 - Population living within 25 km buffer zone - maritime border regions



Map 8 - Population living within 25 km buffer zone - land border regions



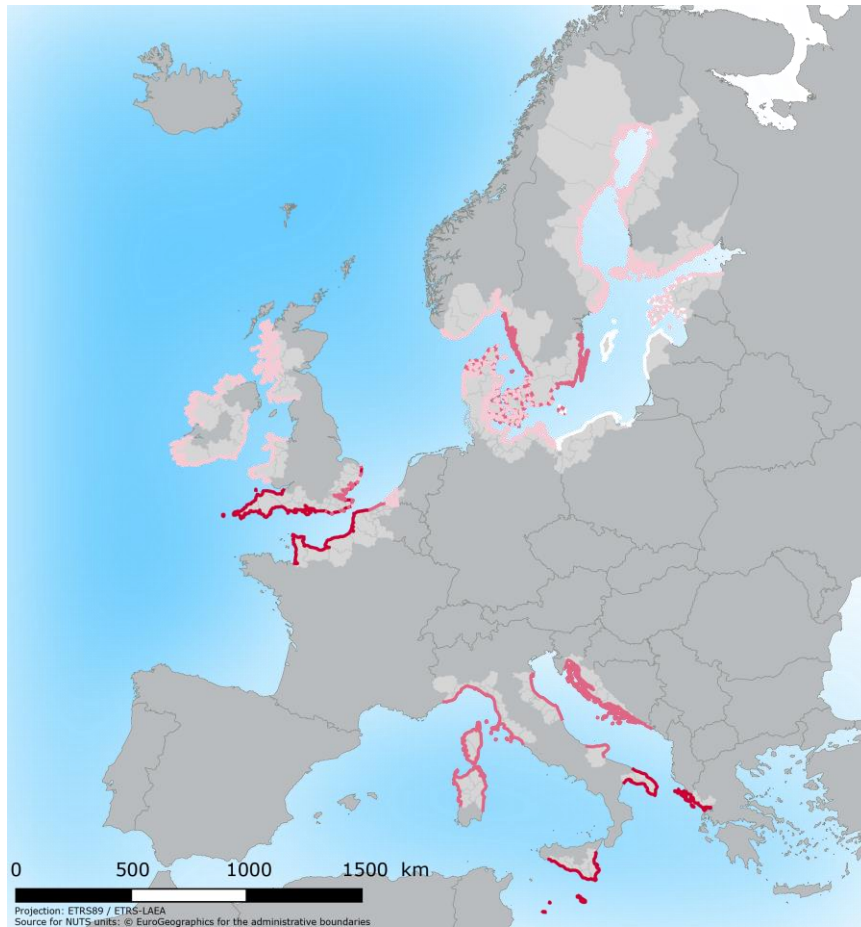
Population living in the buffer of 25km identified in the border region (Population)

Absolute value of the population

- 7,000 - 1,000,000
- 1,000,000 - 2,000,000
- 2,000,000 - 4,000,000
- 4,000,000 - 6,000,000
- 6,000,000 - 15,000,000

NUTS 3 of the border regions
 Area not included in the study

Map 9 - Density of population living within 25 km buffer zone- maritime border regions



Map 10 - Density of population living within 25 km buffer zone - land border regions



Density of population by border region at buffer 25km level

Density of population (inhabitant/km²)

0 - 50

50 - 100

100 - 200

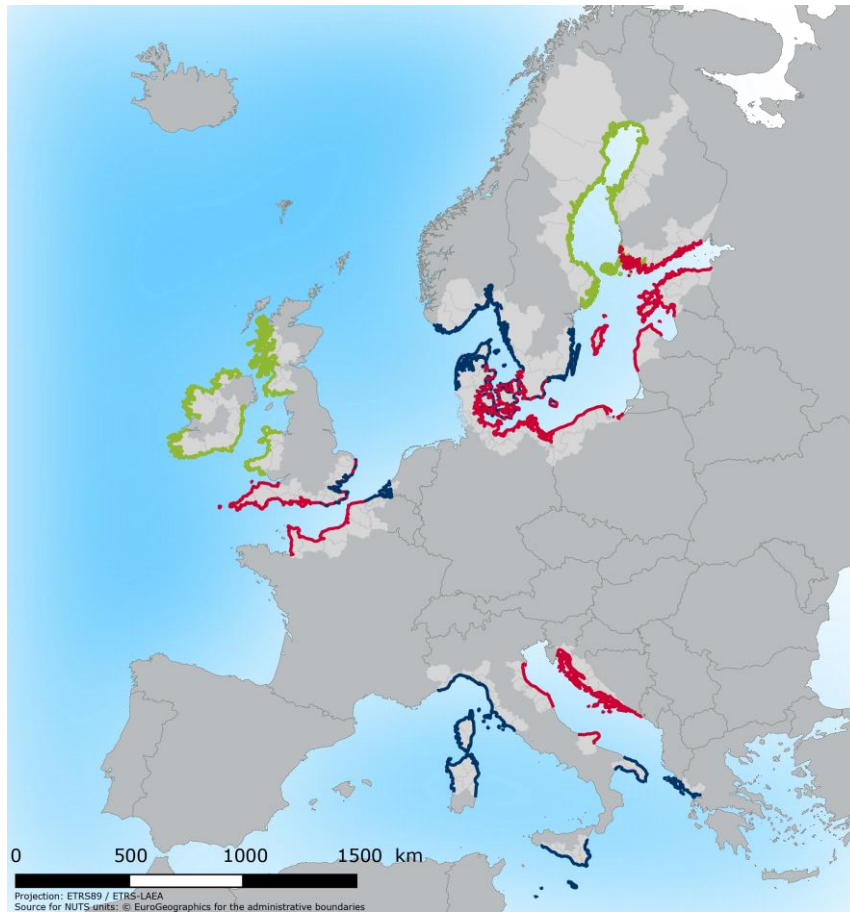
200 - 400

400 - 1,400

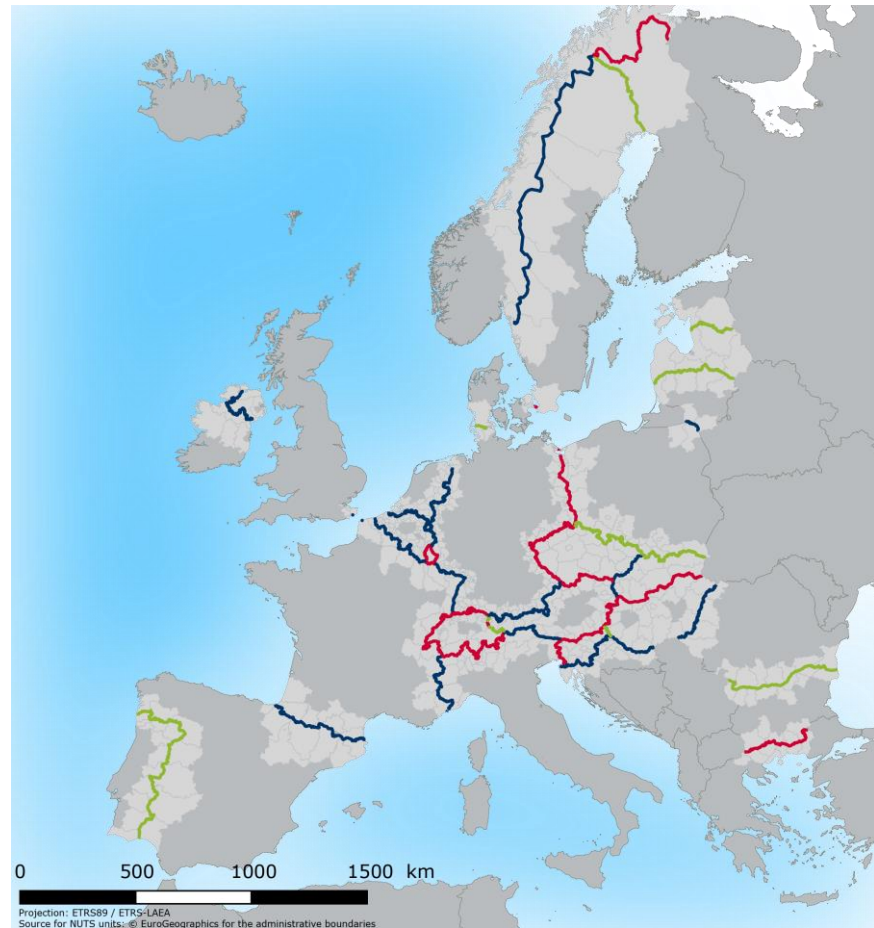
NUTS 3 of the border regions

Area not included in the study

Map 11 - Socio-economic disparities (maritime border regions)



Map 12 - Socio-economic disparities (land border regions)



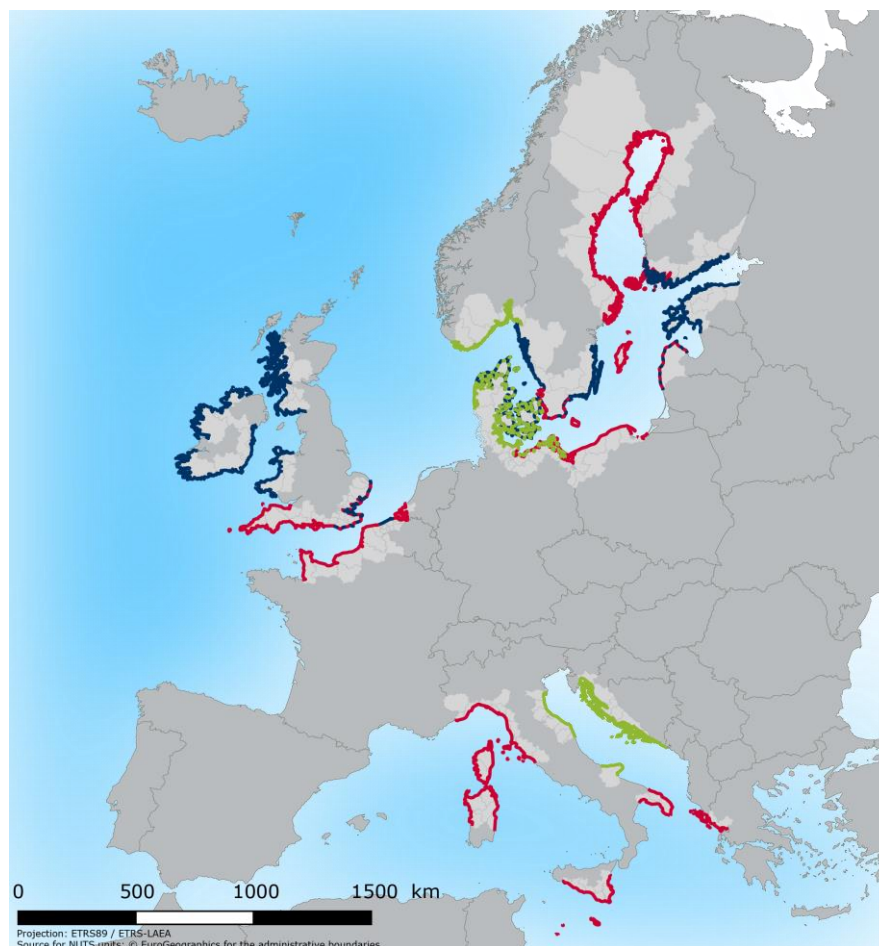
GDP per head ratio

Relevant position of the border region compared to EU border region average

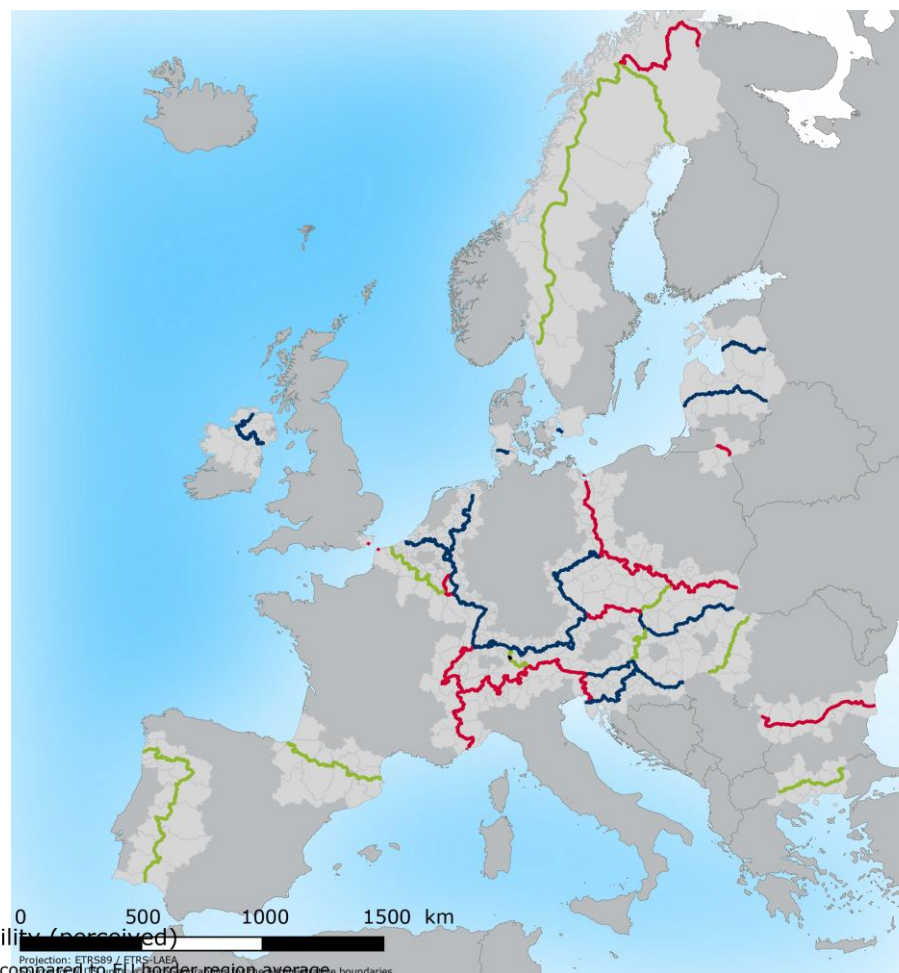
- Less obstacle
- Average
- More obstacle

- NUTS 3 of the border regions
- Area not included in the study

Map 13 - Physical obstacles (maritime border regions)



Map 14 - Physical obstacles (land border regions)



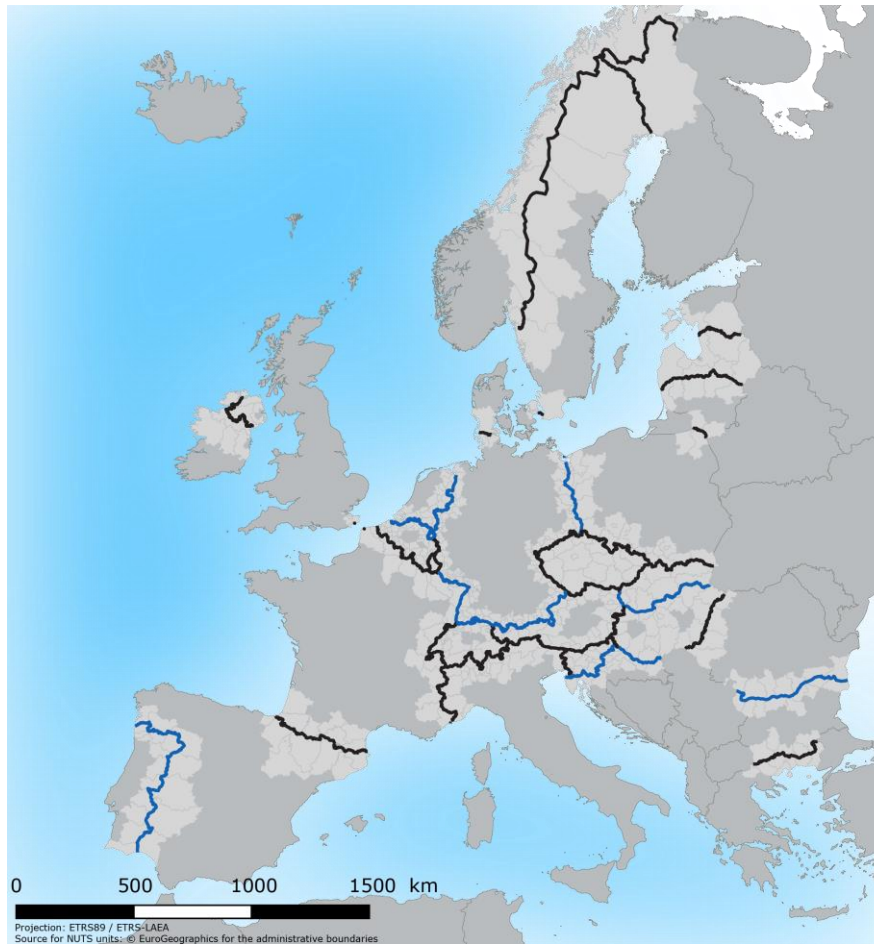
Difficulty in physical accessibility (perceived)

Relevant position of the border region compared to EU border region average

- Less obstacle
- Average
- More obstacle
- N.A.

- NUTS 3 of the border regions
- Area not included in the study

Map 15 - River obstacles (land border regions)



Rivers

Presence of rivers within the 5km buffer of the border lines

- River obstacle
- No river obstacle

- NUTS 3 of the border regions
- Area not included in the study

Map 16 - Mountain obstacles (land border regions)



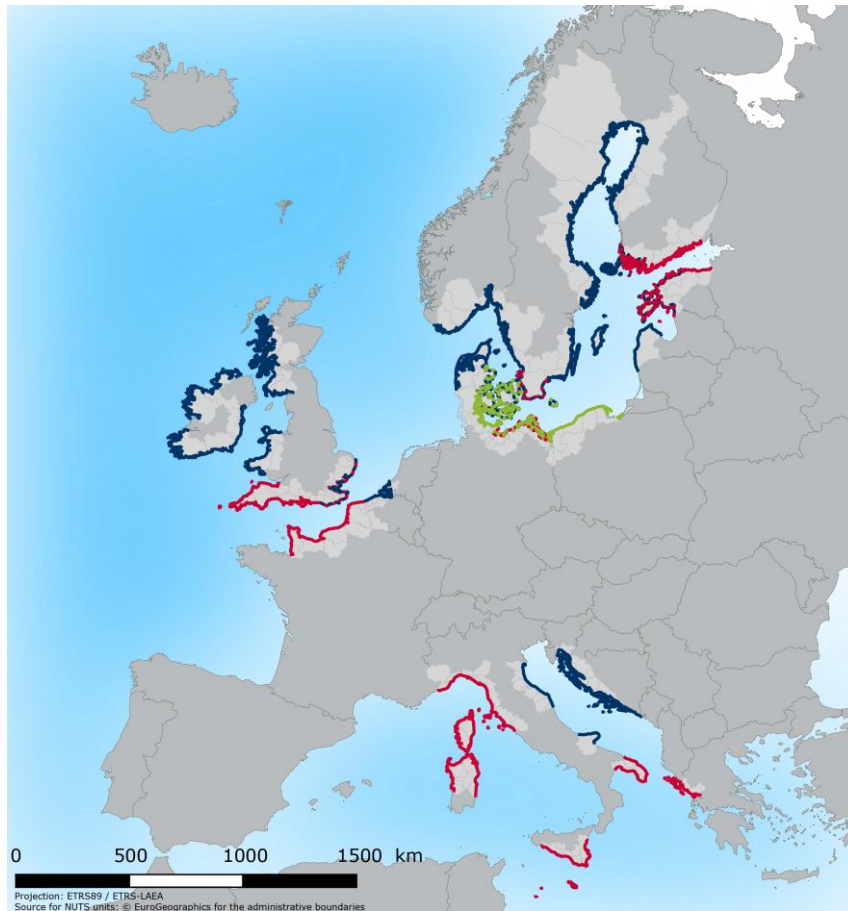
Mountain barriers

Presence of mountains barriers which cross the border lines

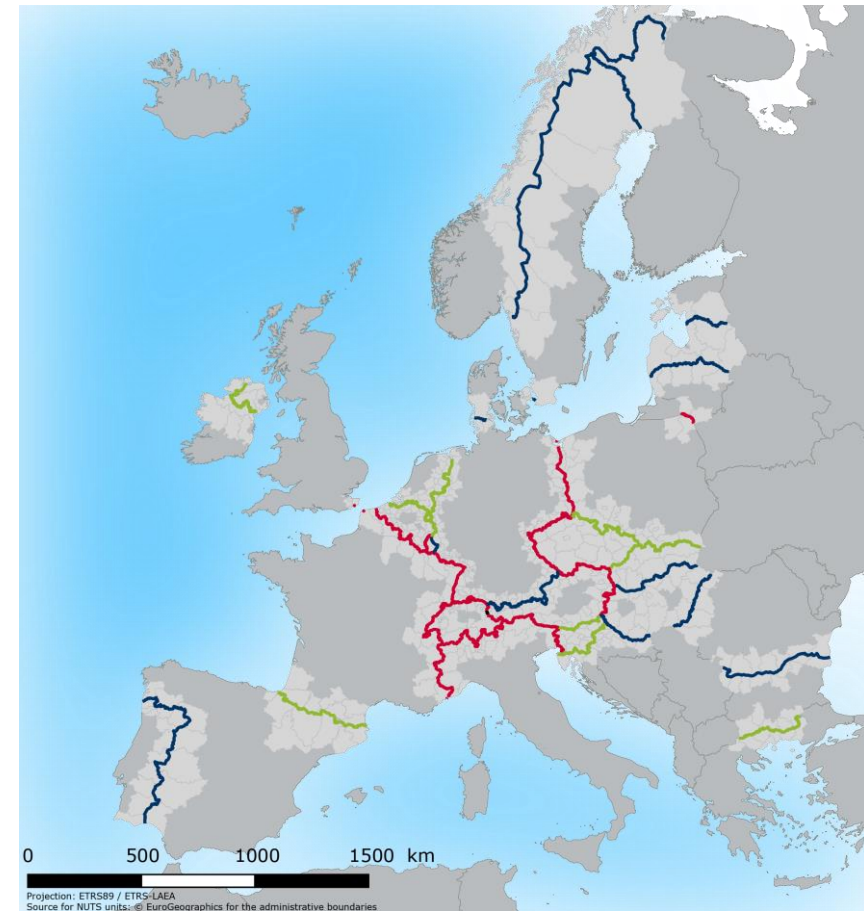
- Mountain obstacle
- No mountain obstacle

- NUTS 3 of the border regions
- Area not included in the study

**Map 17 - Normative and institutional obstacles
(maritime border regions)**



**Map 18 - Normative and institutional obstacles
(maritime border regions)**



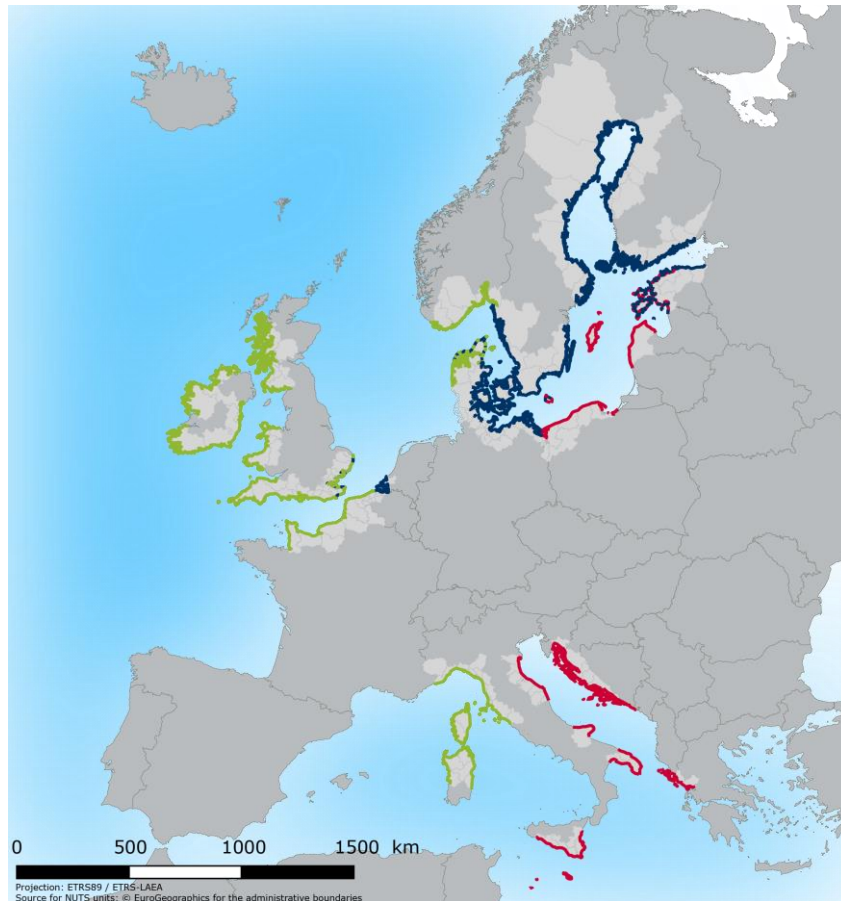
Legal and administrative barriers

Relevant position of the border region compared to EU border region average

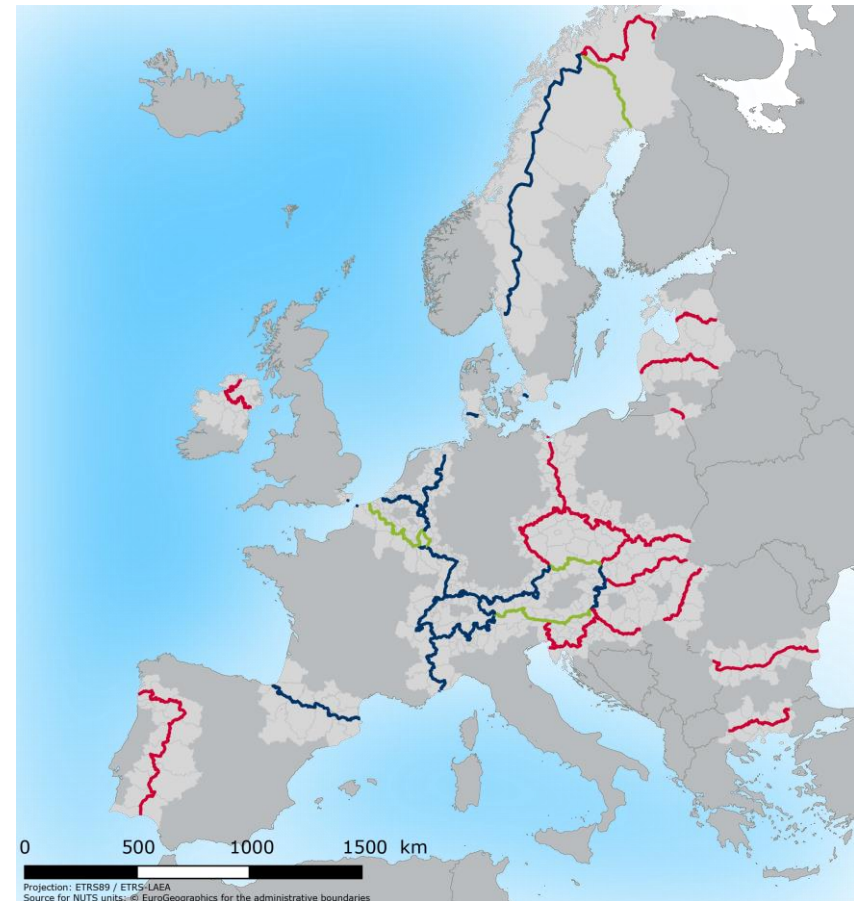
- Less obstacle
- Average
- More obstacle
- N.A.

- NUTS 3 of the border regions
- Area not included in the study

Map 19 - Competitiveness potential - knowledge creation (maritime border regions)



Map 20 - Competitiveness potential - knowledge creation (land border regions)

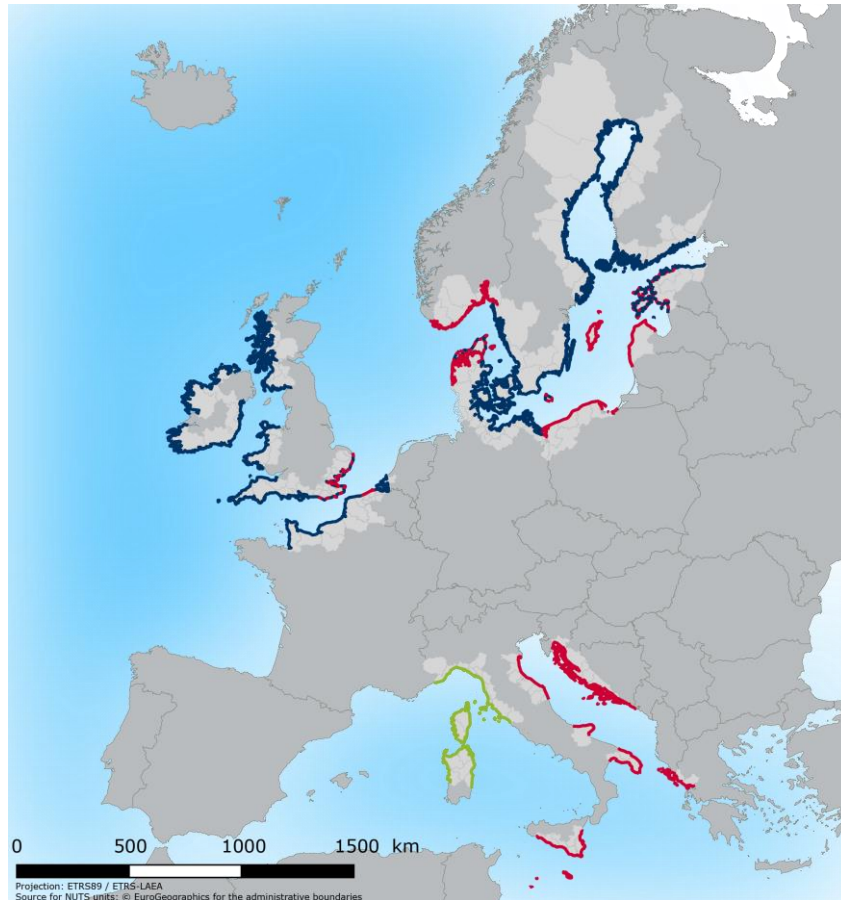


Patent applications index

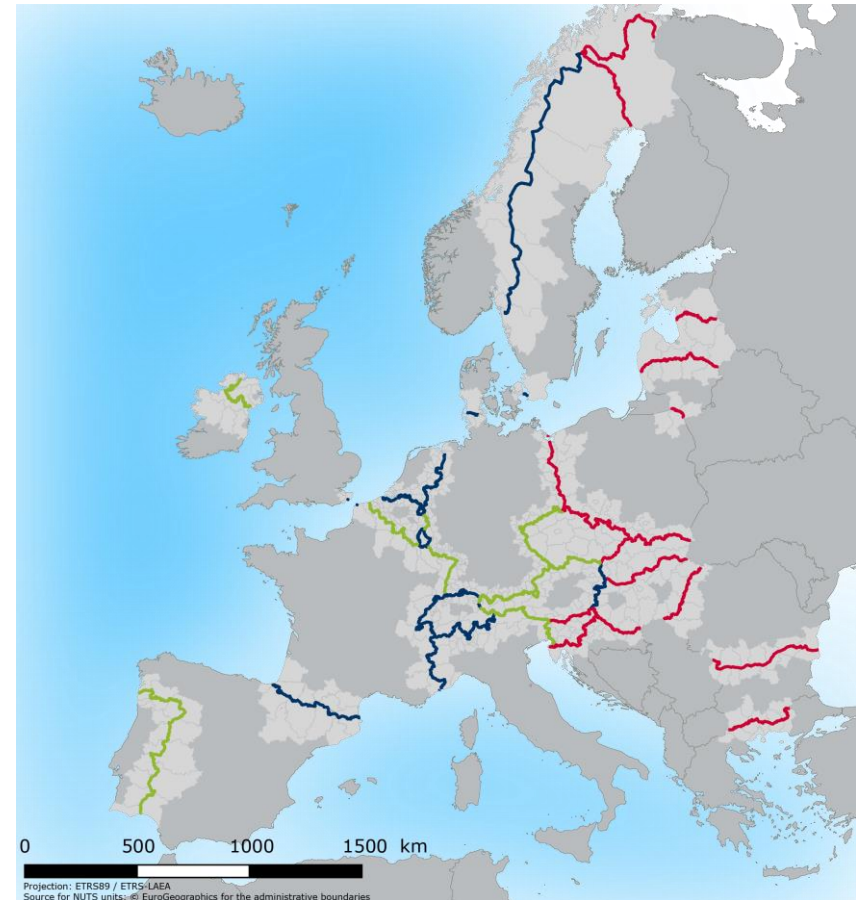
Relevant position of the border region compared to EU border region average

- Less potential
- Average
- More potential
- NUTS 3 of the border regions
- Area not included in the study

Map 21 – Competitiveness potential - product innovation (maritime border regions)



Map 22 – Competitiveness potential - product innovation (land border regions)



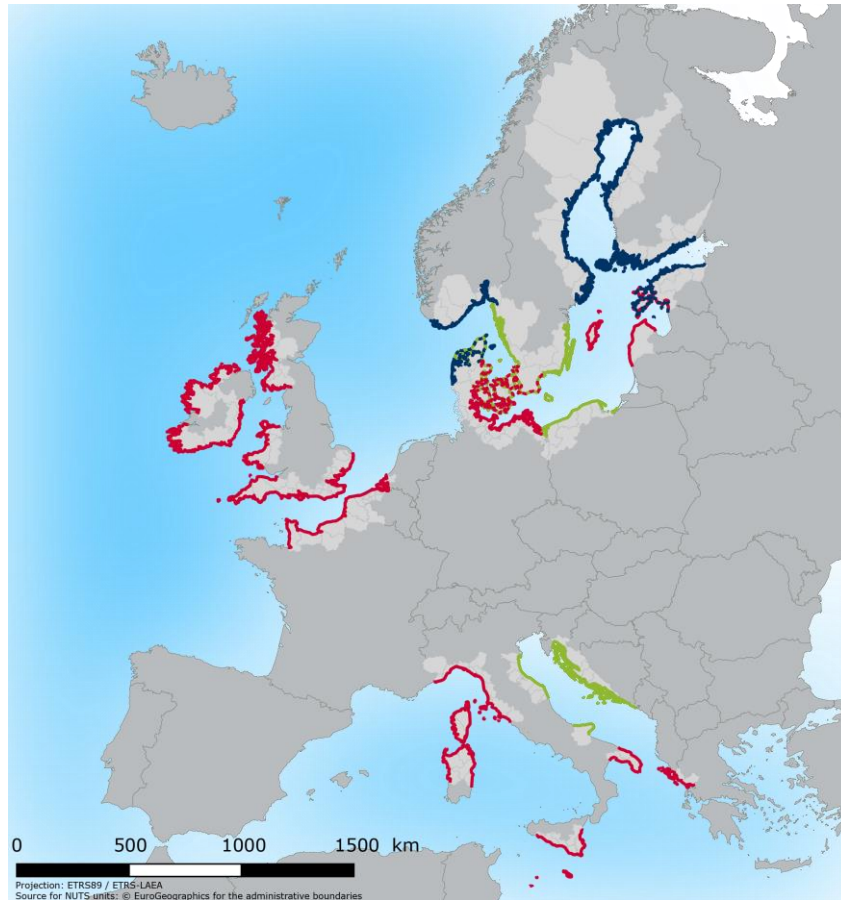
Trade mark applications index

Relevant position of the border region compared to EU border region average

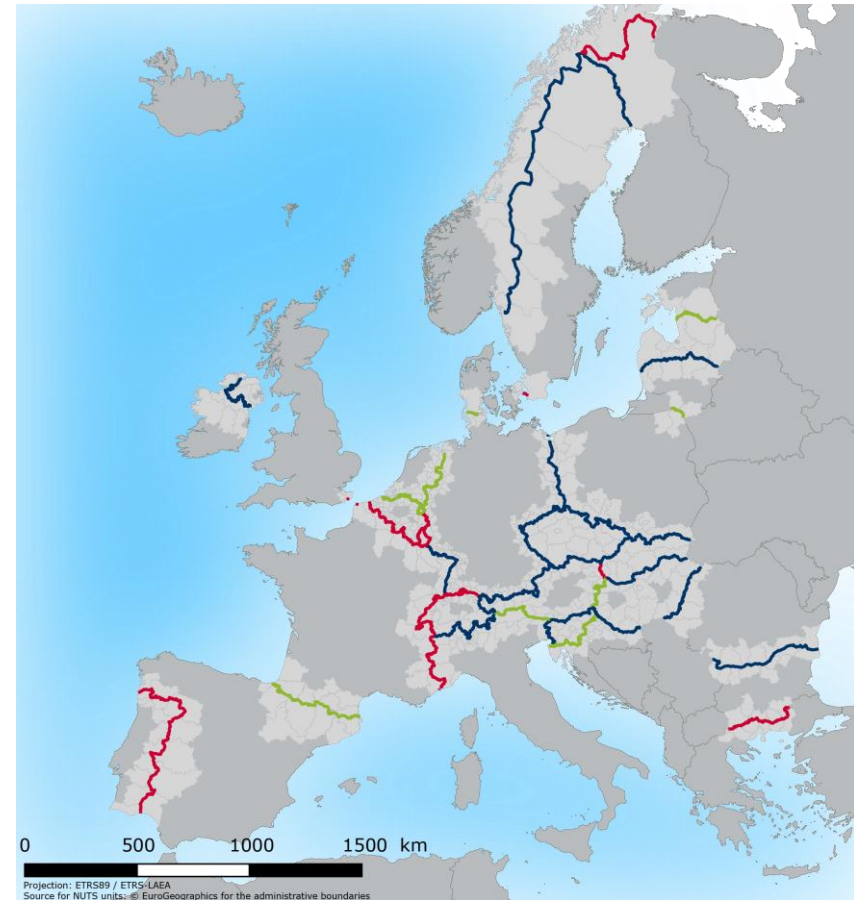
- Less potential
- Average
- More potential

- NUTS 3 of the border regions
- Area not included in the study

Map 23 – Competitiveness potential – industrial activities (maritime border regions)



Map 24 – Competitiveness potential – industrial activities (land border regions)



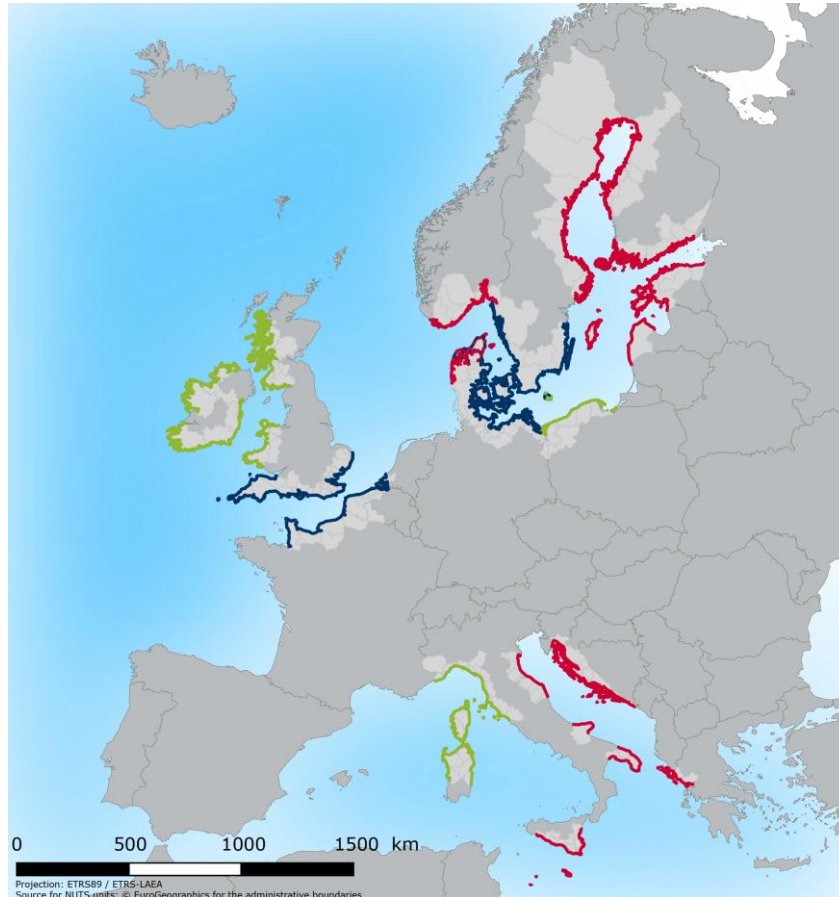
Industrial activity index

Relevant position of the border region compared to EU border region average

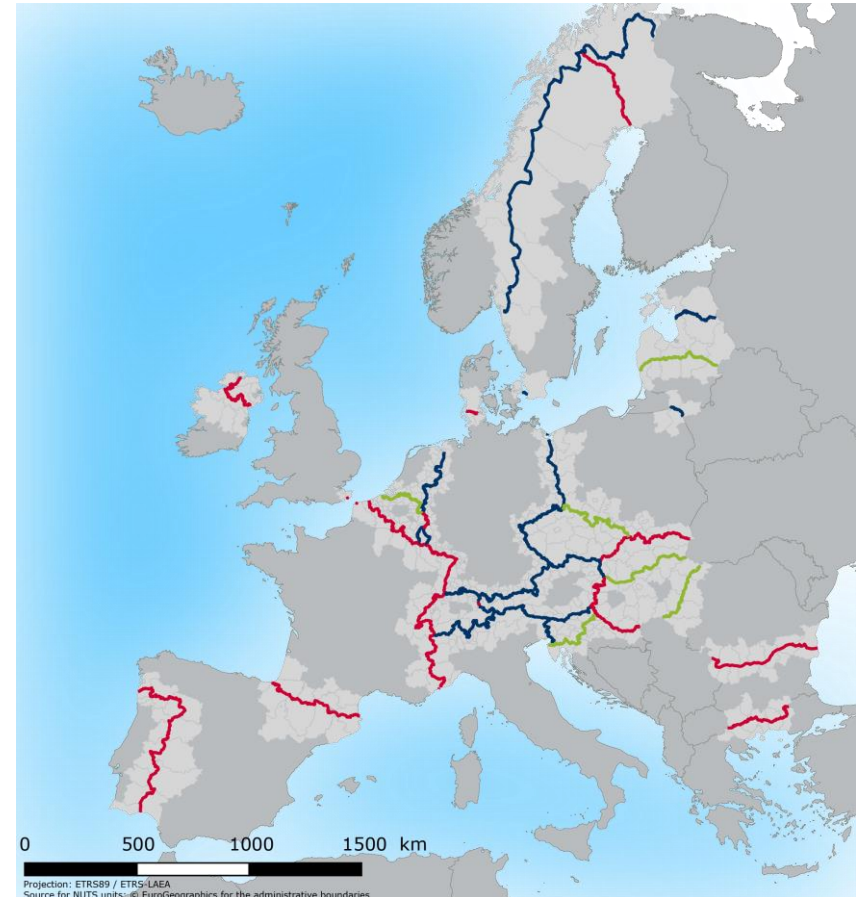
- Less potential
- Average
- More potential

- NUTS 3 of the border regions
- Area not included in the study

Map 25 – Market integration potential - multimodal accessibility potential (maritime border regions)



Map 26 – Market integration potential - multimodal accessibility potential (land border regions)



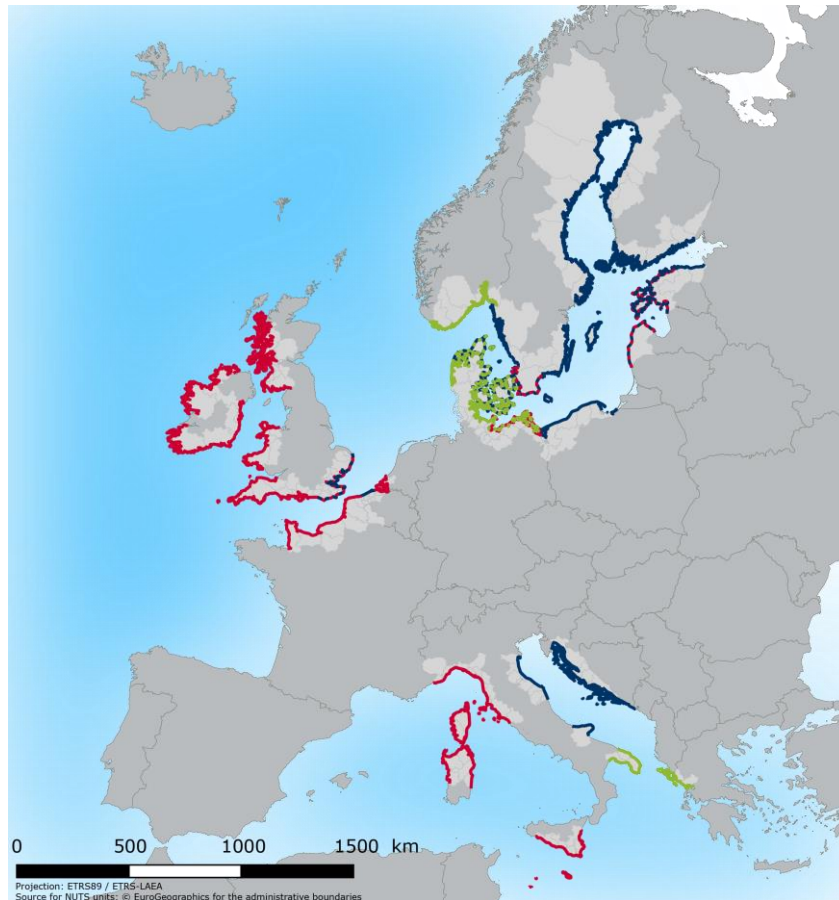
Multimodal accessibility index

Relevant position of the border region compared to EU border region average

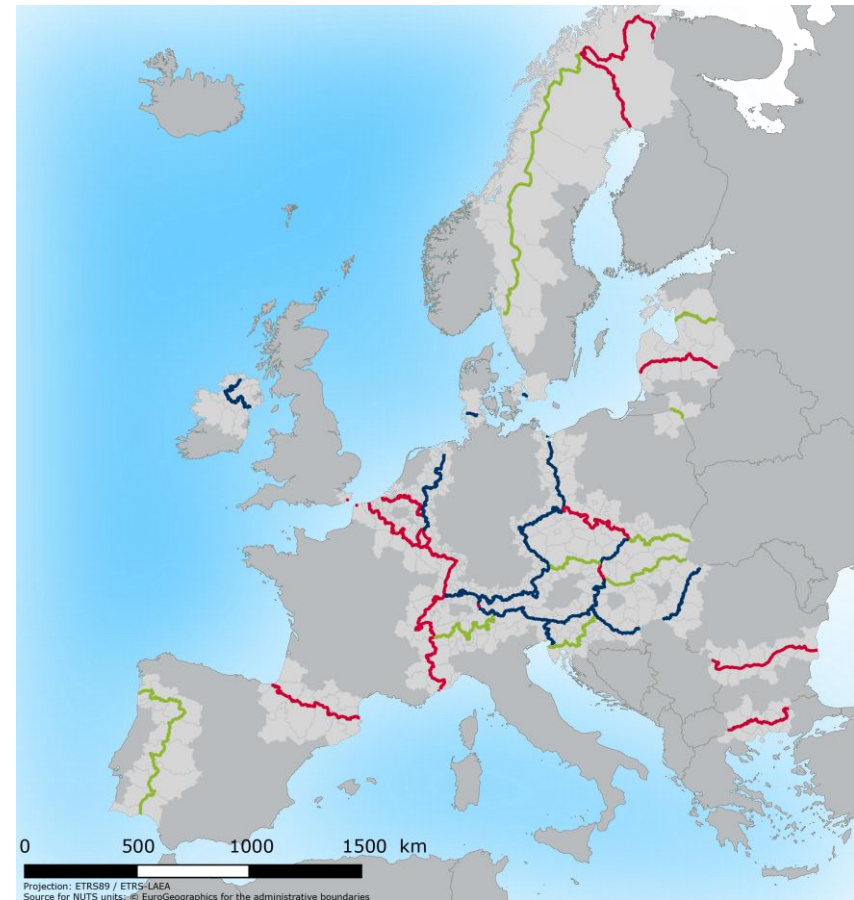
- Less potential
- Average
- More potential

- NUTS 3 of the border regions
- Area not included in the study

Map 27 – Market integration potential - cross-border labour market (maritime border regions)



Map 28 – Market integration potential - cross-border labour market (land border regions)



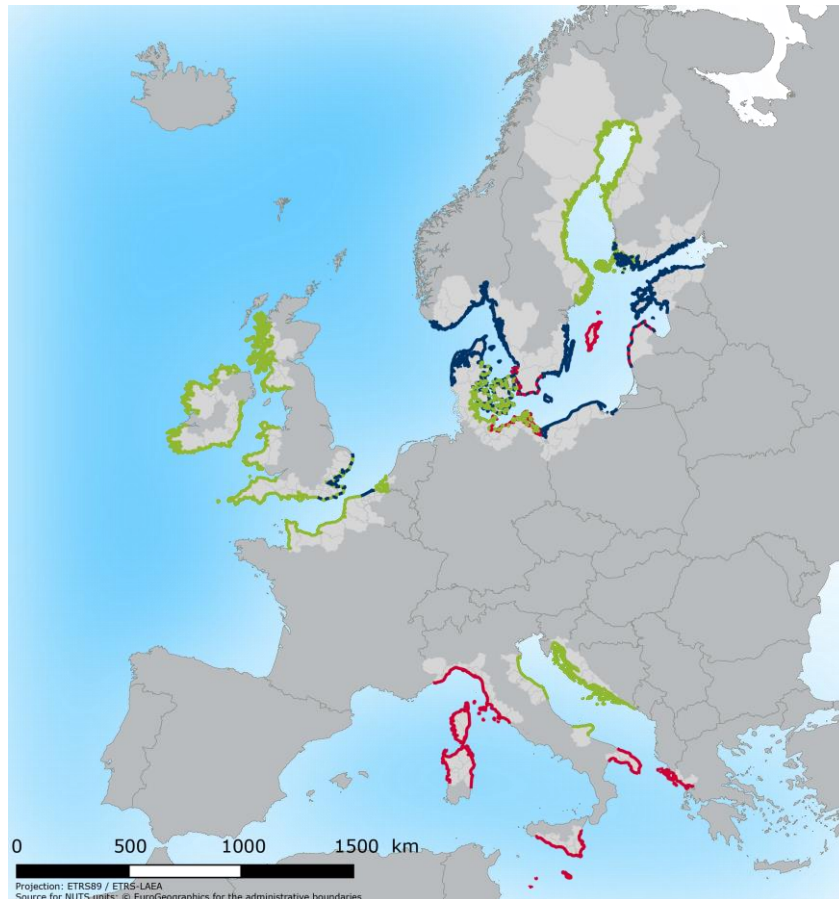
Index of employment rate differences across the borders

Relevant position of the border region compared to EU border region average

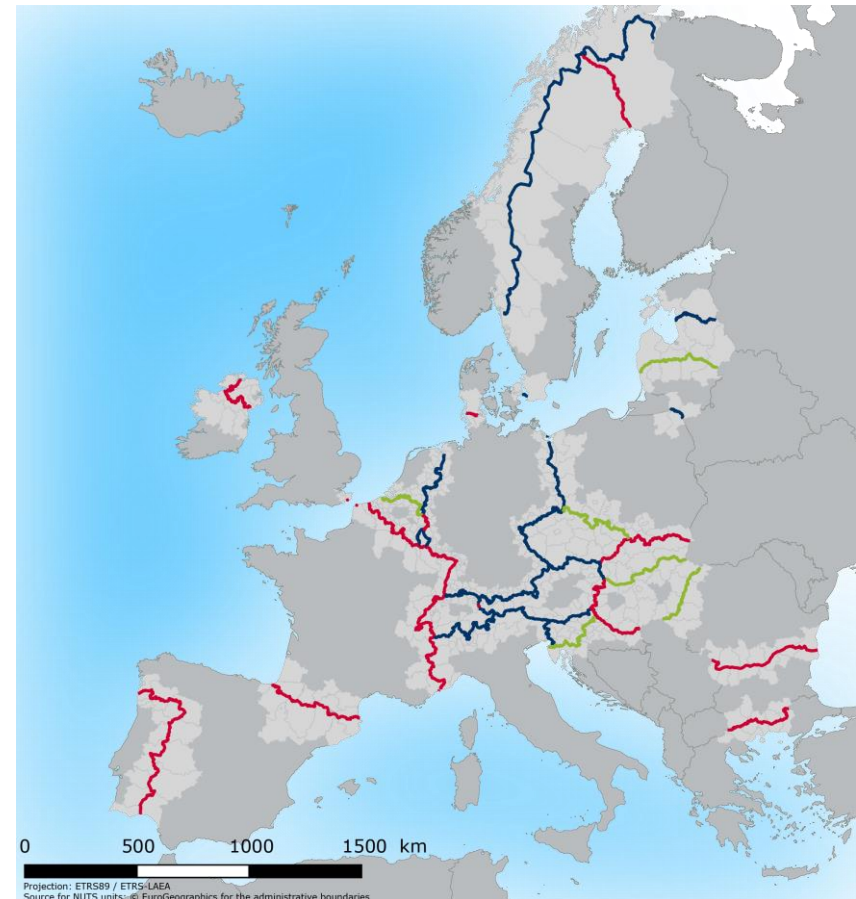
- Less potential
- Average
- More potential

- NUTS 3 of the border regions
- Area not included in the study

Map 29 – Market integration potential - cross-border labour market (maritime border regions)



Map 30 – Market integration potential - cross-border labour market (land border regions)



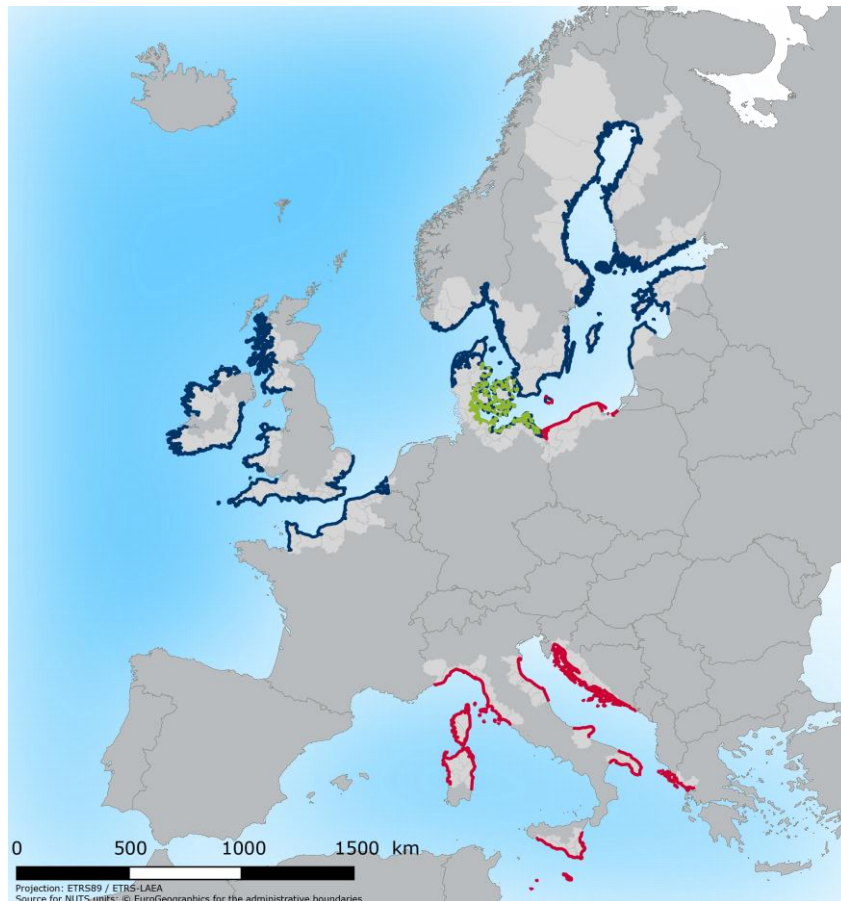
Employment rate index

Relevant position of the border region compared to EU border region average

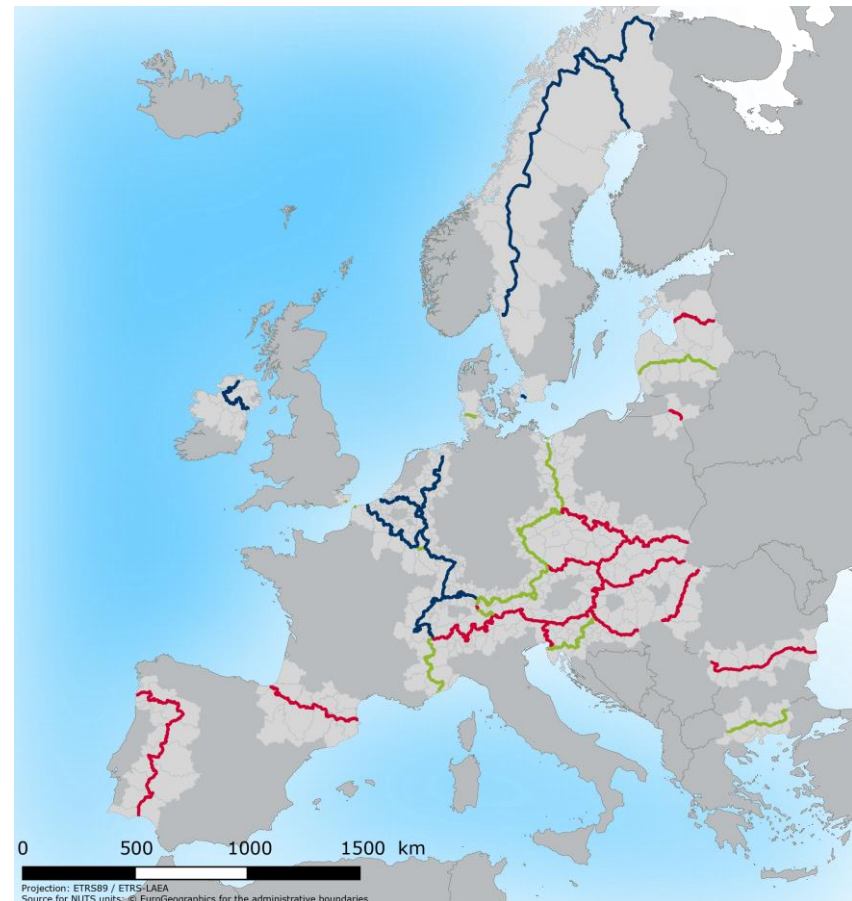
- Less potential
- Average
- More potential

- NUTS 3 of the border regions
- Area not included in the study

**Map 31 – Human and social capital – education level
(maritime border regions)**



**Map 32 – Human and social capital – education level
(land border regions)**



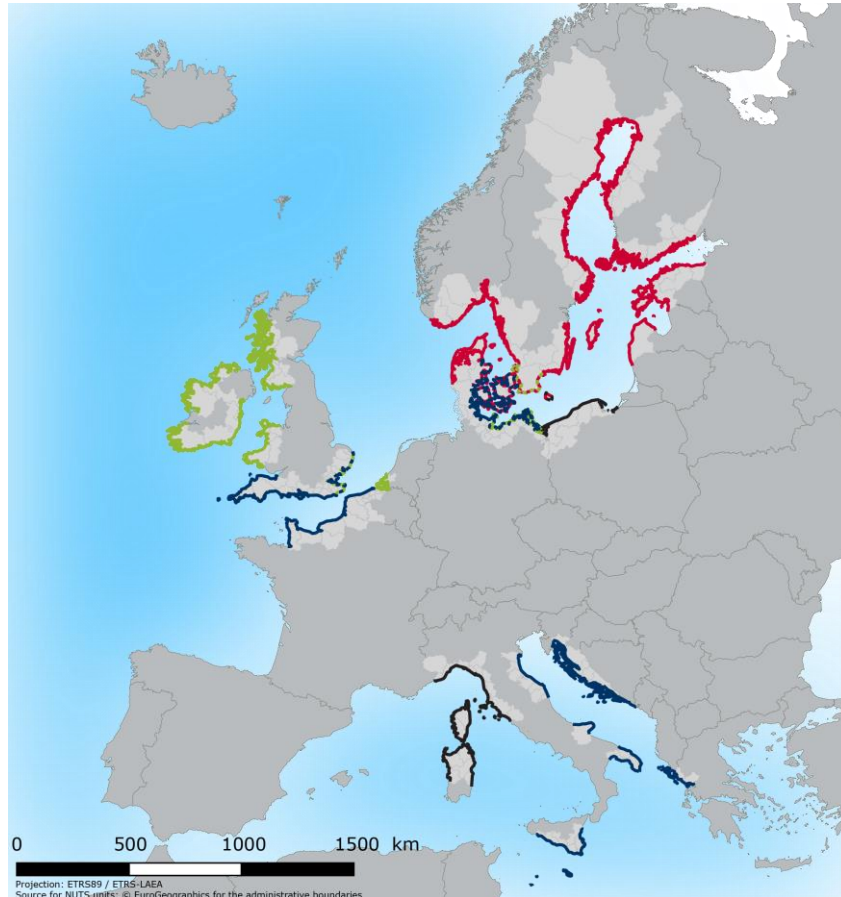
Human capital index

Relevant position of the border region compared to EU border region average

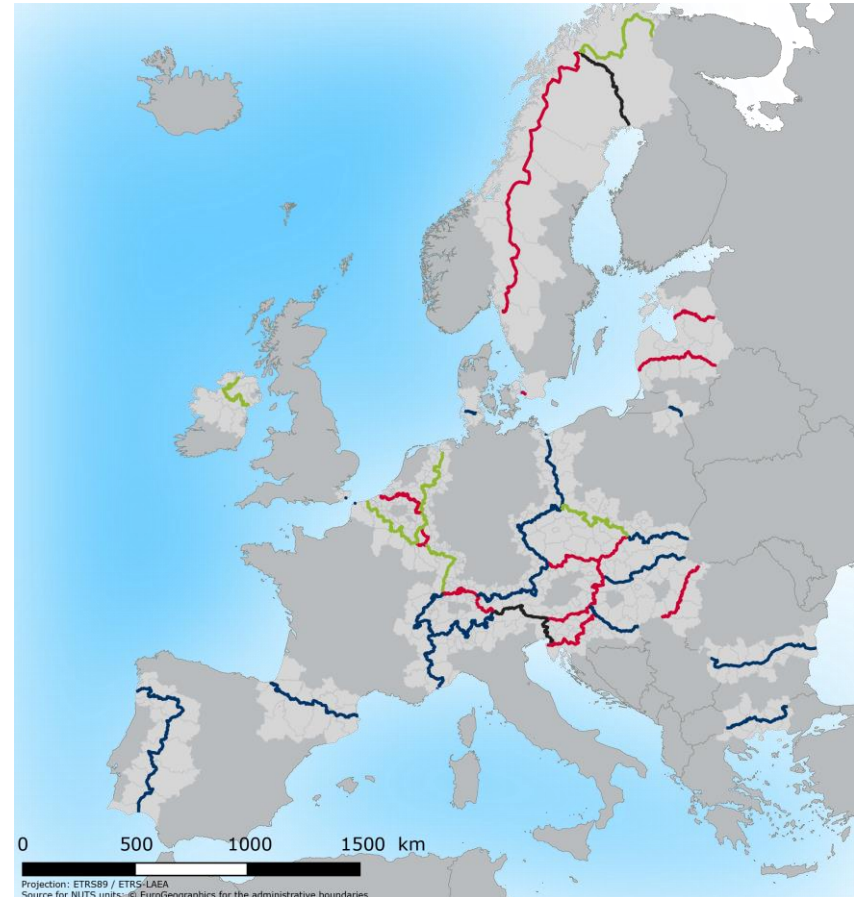
- Less potential
- Average
- More potential

- NUTS 3 of the border regions
- Area not included in the study

Map 33 – Human and social capital – volunteerism (maritime border regions)



Map 34 – Human and social capital – volunteerism (land border regions)

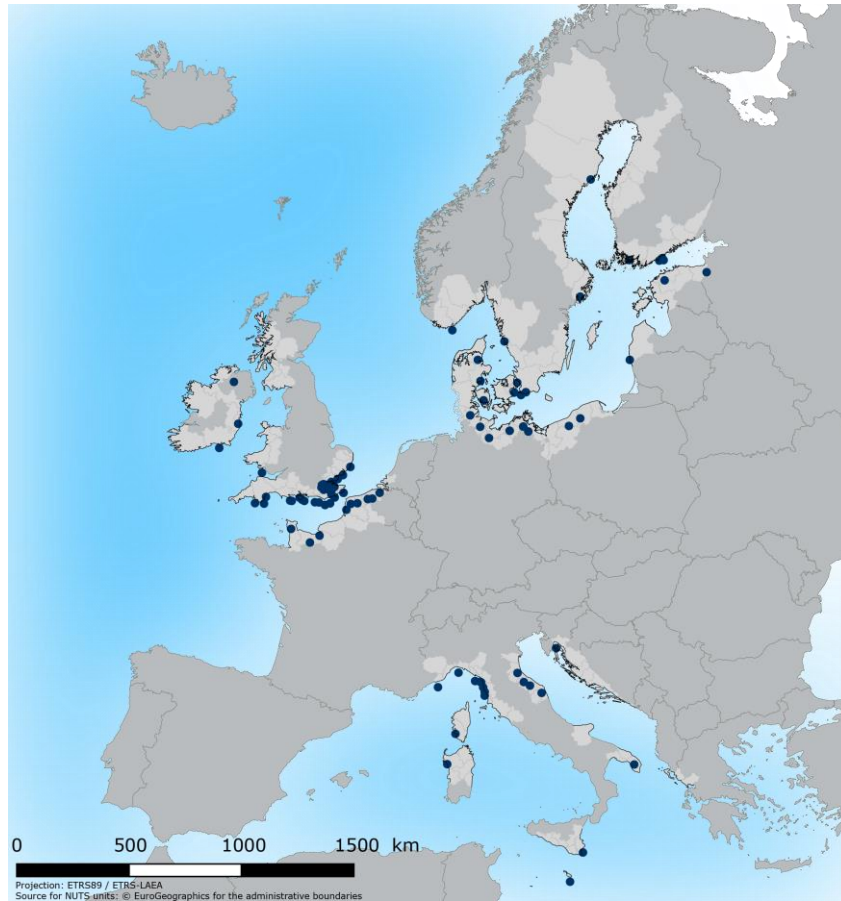


Volunteerism

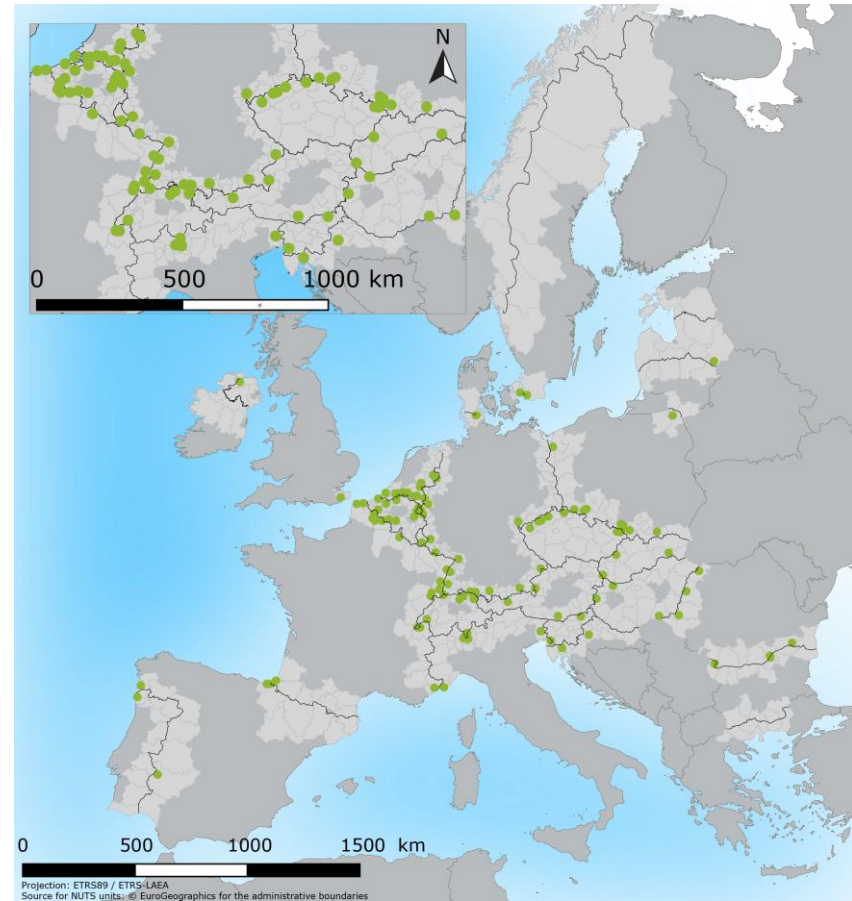
Relevant position of the border region compared to EU border region average

- Less potential
- Average
- More potential
- N.A.
- NUTS 3 of the border regions
- Area not included in the study

Map 35 – Potential of integrated services for cross-border functional urban areas - presence of cities (maritime border regions)



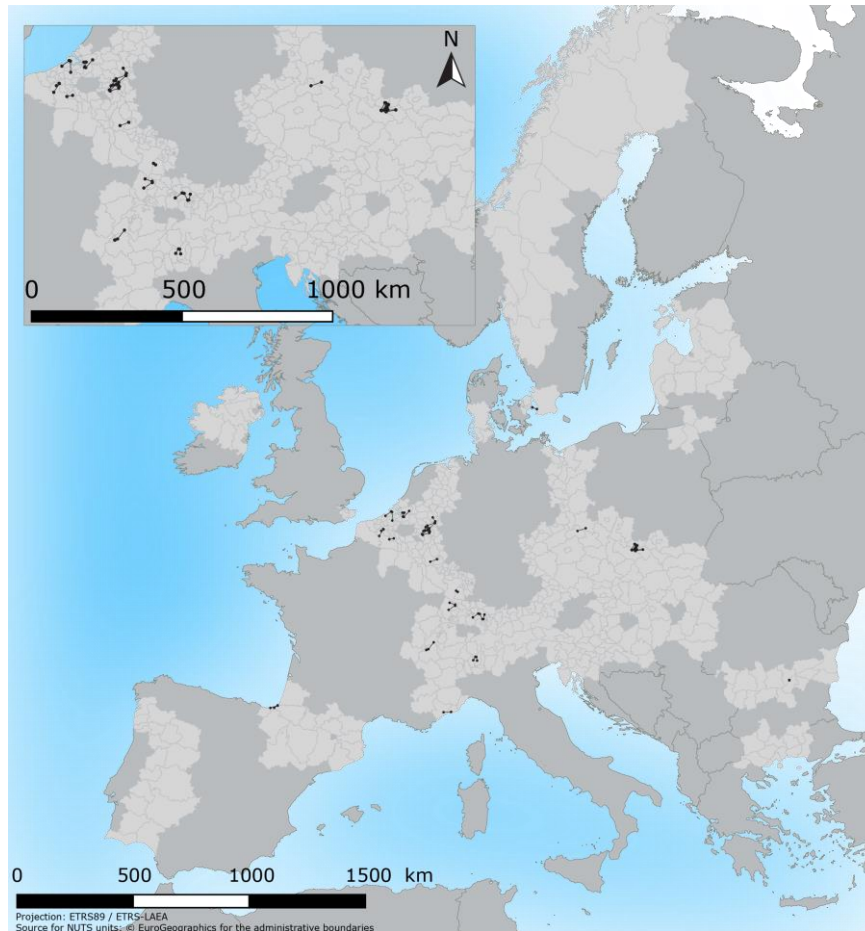
Map 36 – Potential of integrated services for cross-border functional urban areas - presence of cities (land border regions)



Cities within the buffer 25km of the border lines

- Maritime cities
- Land cities
- NUTS 3 of the border regions
- Area not included in the study

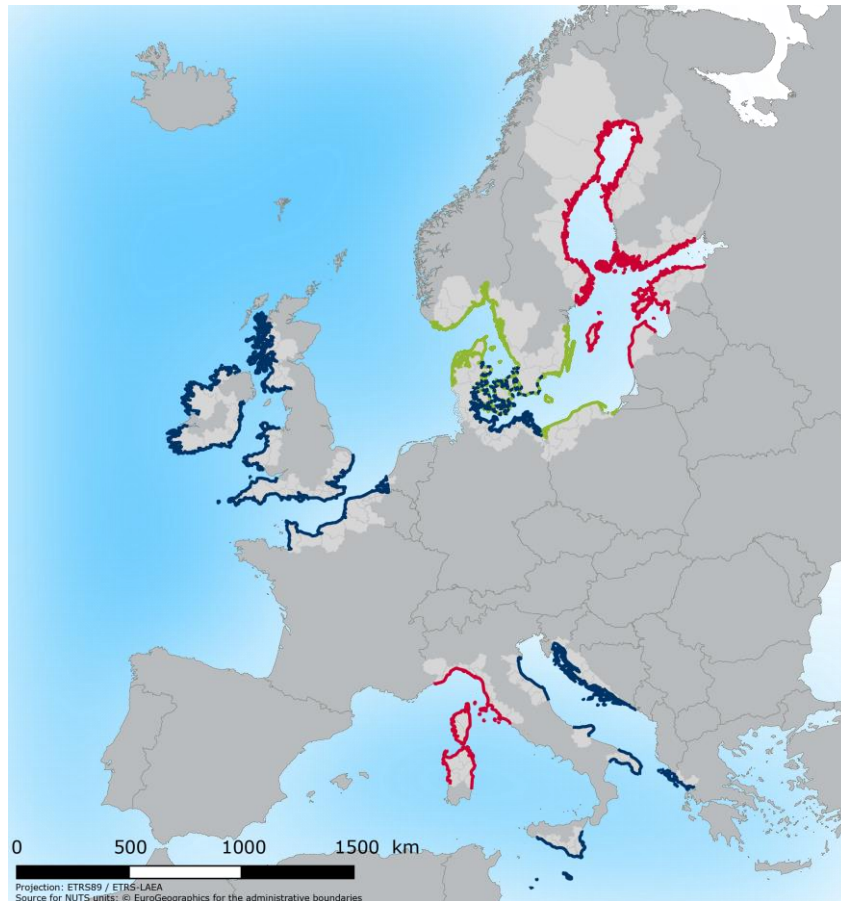
Map 37 – Potential of integrated services for cross-border functional urban areas - presence of coupled cities (land border regions)



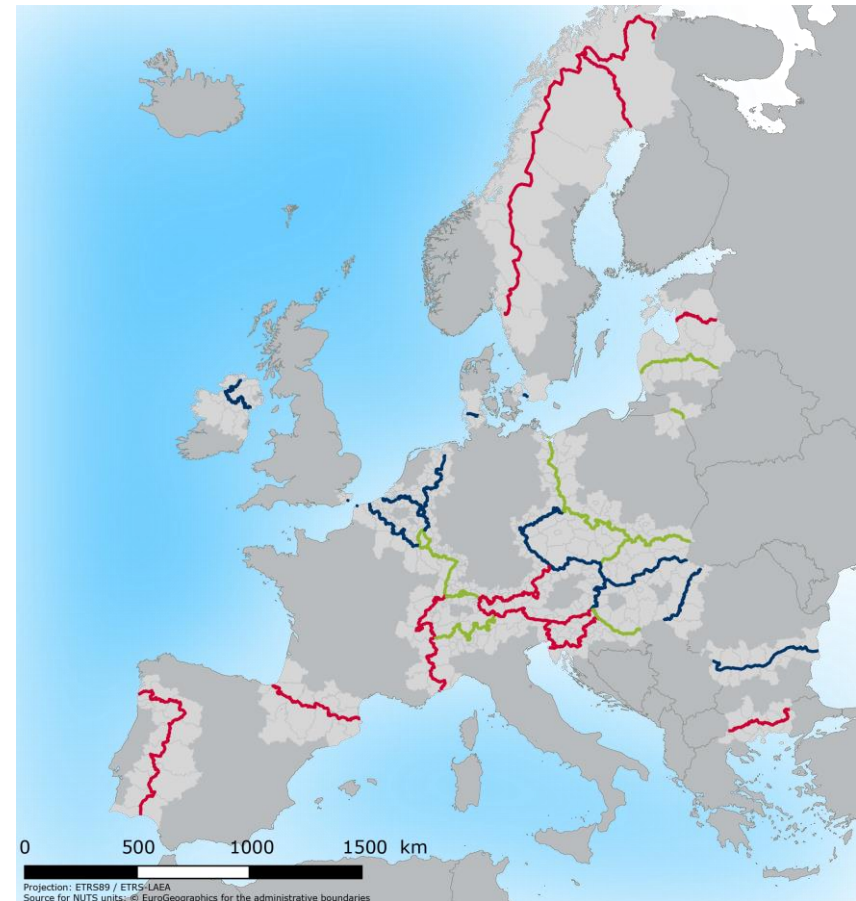
Crossborder cities within the 25km buffer of the border lines

- Crossborder cities couple
- NUTS 3 of the border regions
- Area not included in the study

Map 38 – Potential from natural resources – natural and protected area (maritime border regions)



Map 39 – Potential from natural resources – natural and protected area (land border regions)



Index of natural and protected areas

Relevant position of the border region compared to EU border region average

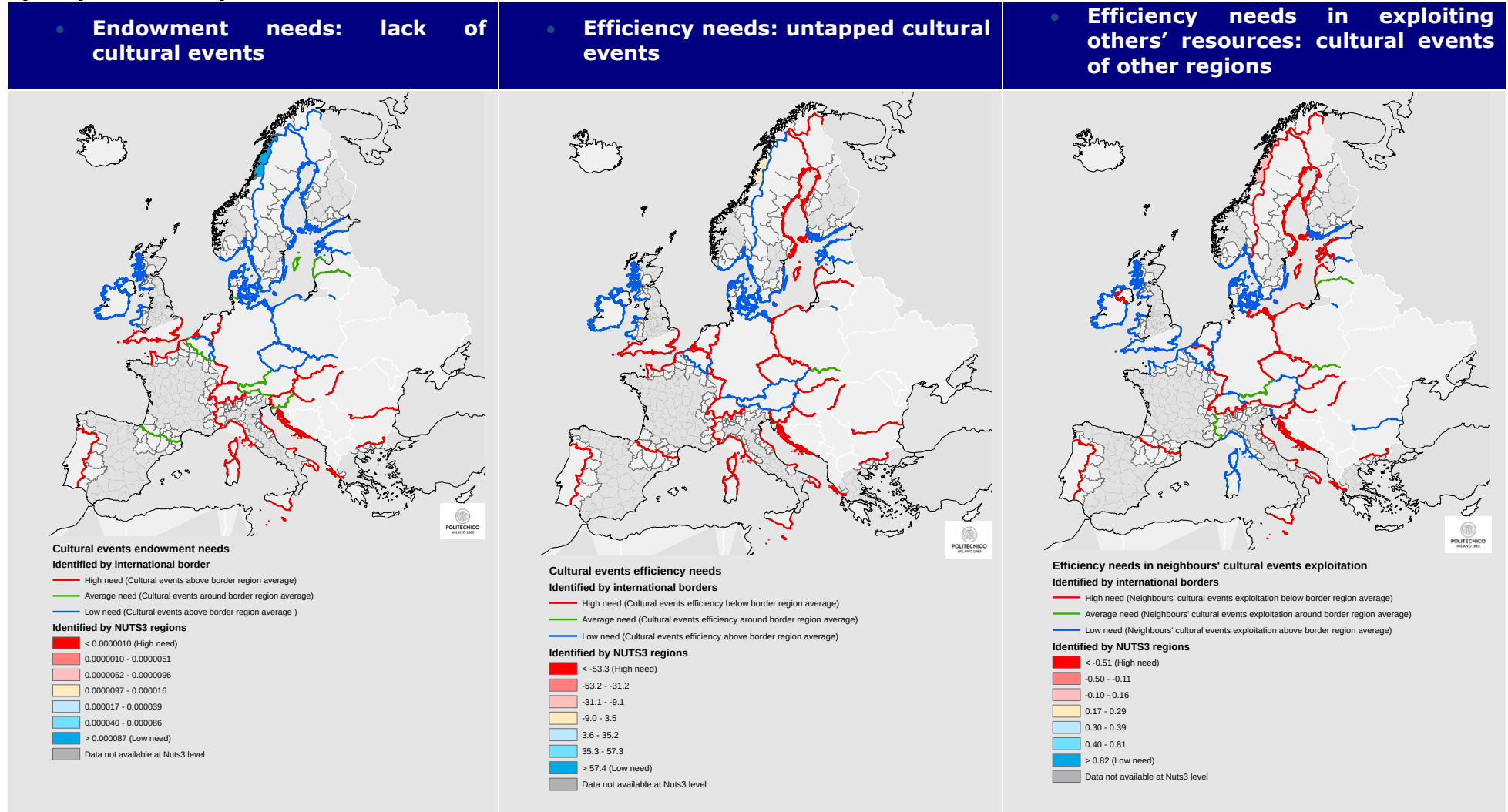
- Less potential
- Average
- More potential

- NUTS 3 of the border regions
- Area not included in the study

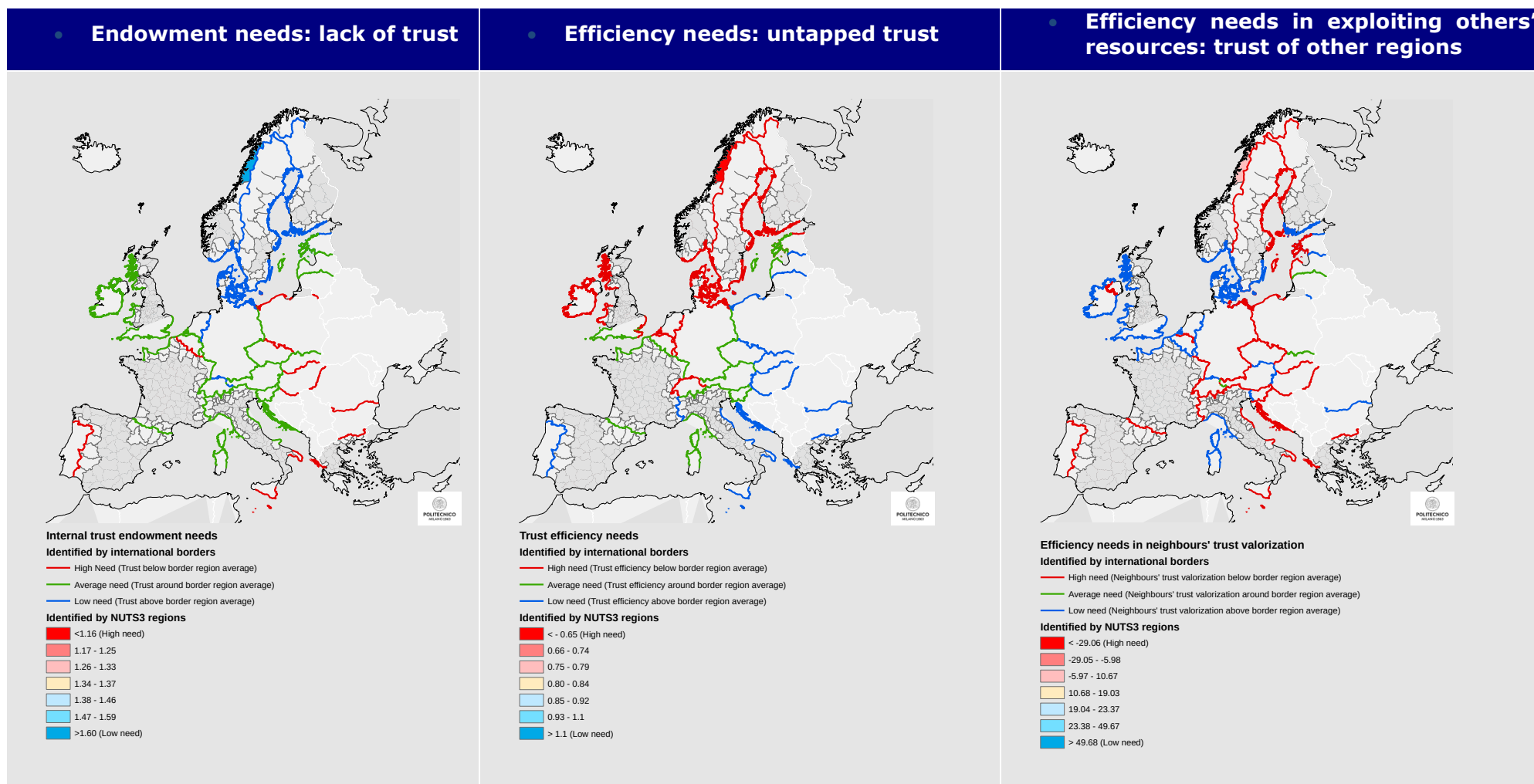
ANNEX 3: ADDITIONAL MAPS (SECTION 5)

This Annex contains the maps illustrating the findings of section 5.

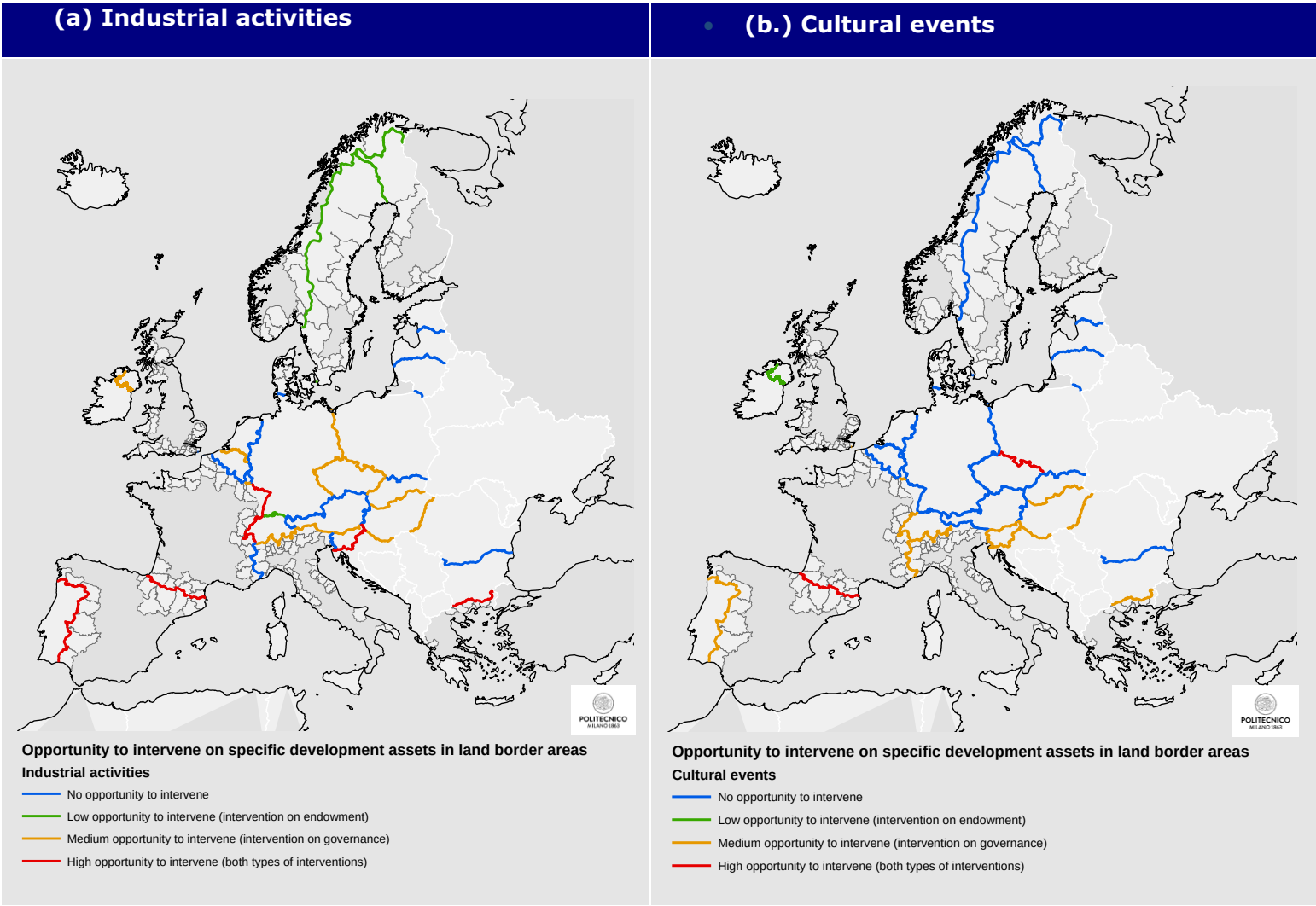
Map 40 - Untapped cultural events, lack of cultural events and untapped cultural events of other regions (competitiveness)



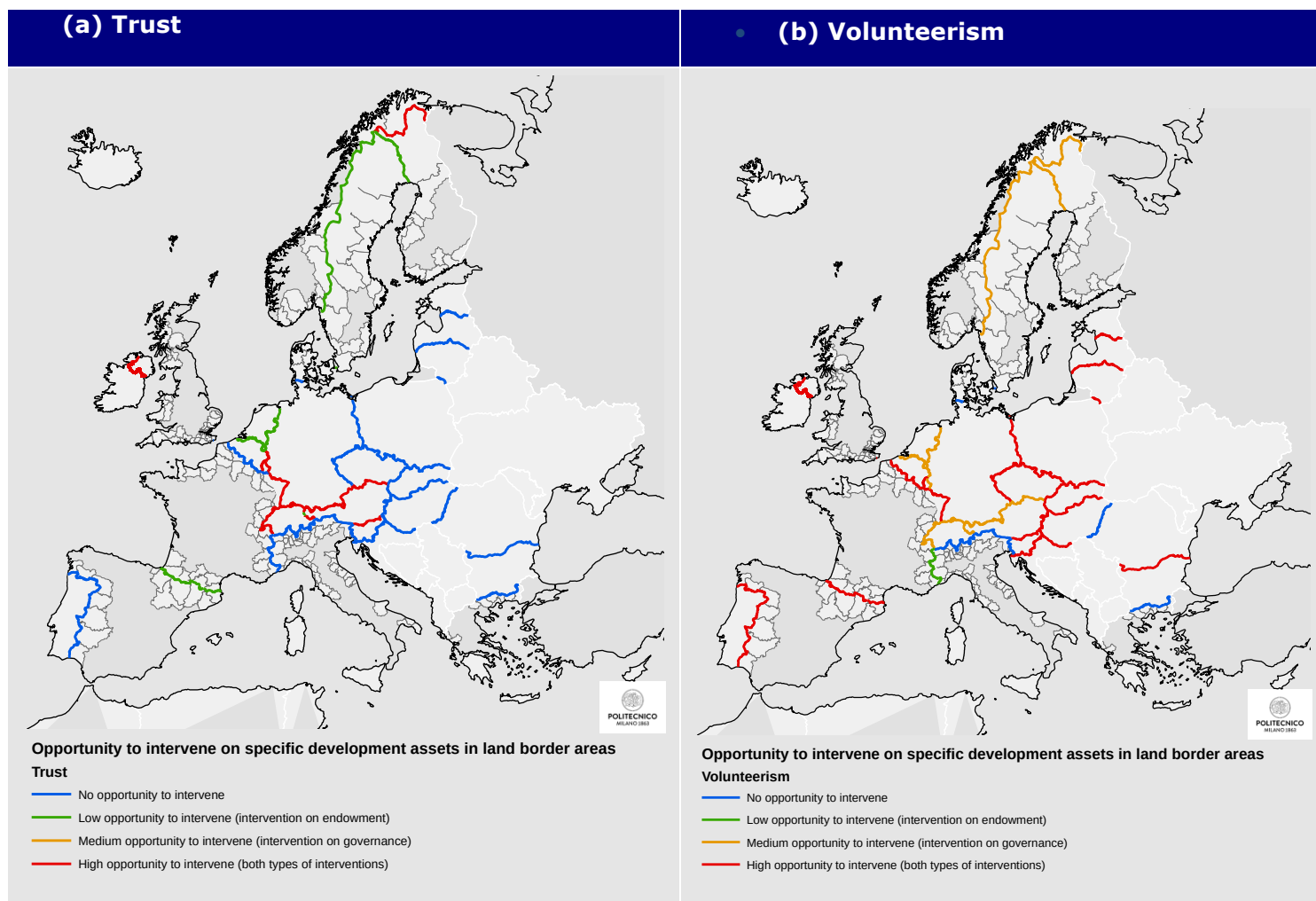
Map 41 - Untapped internal trust, lack of internal trust and untapped internal trust of other regions (social and human capital)



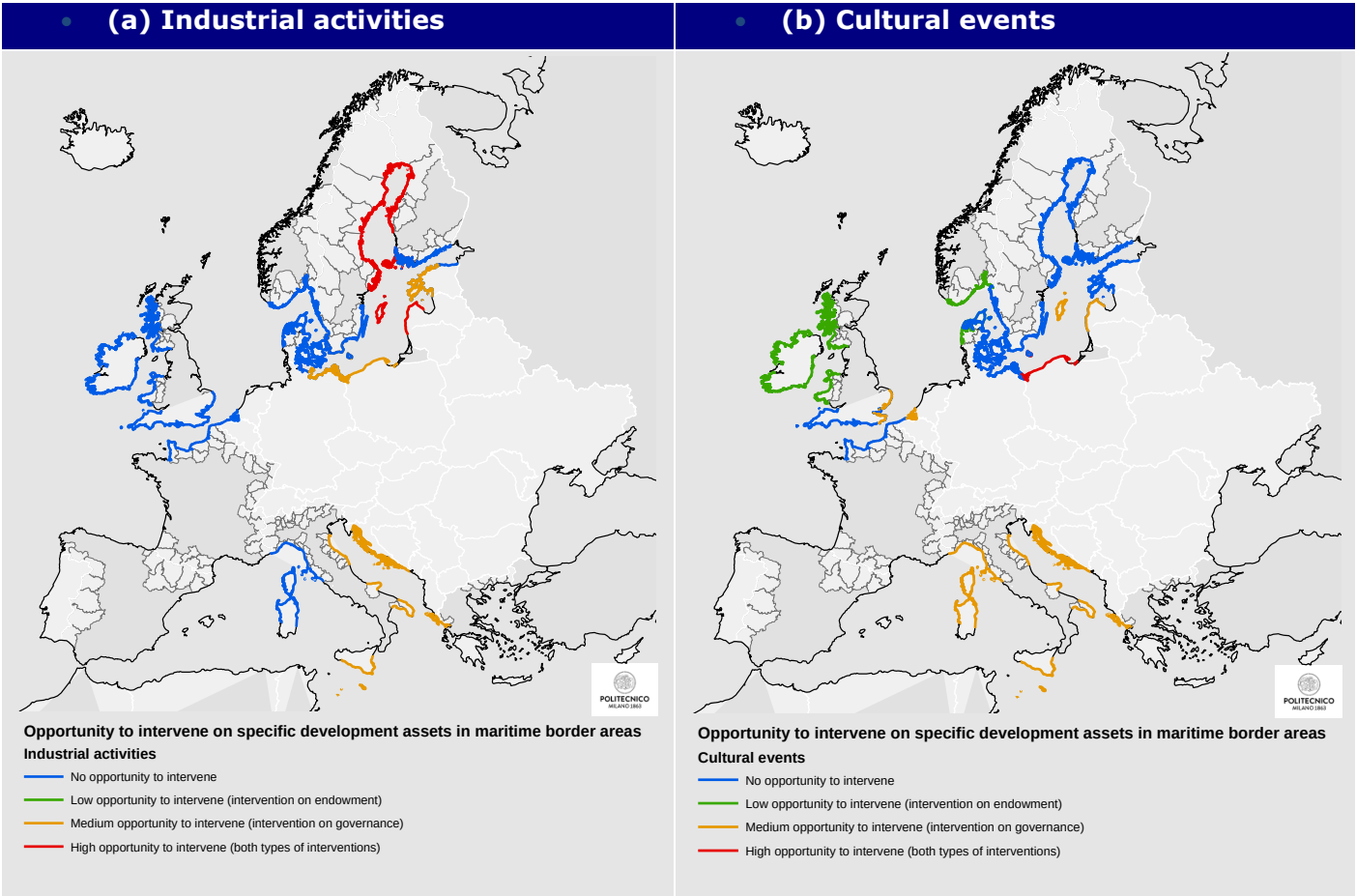
Map 42 - Opportunity to intervene for economic growth goal: land border areas (competitiveness)



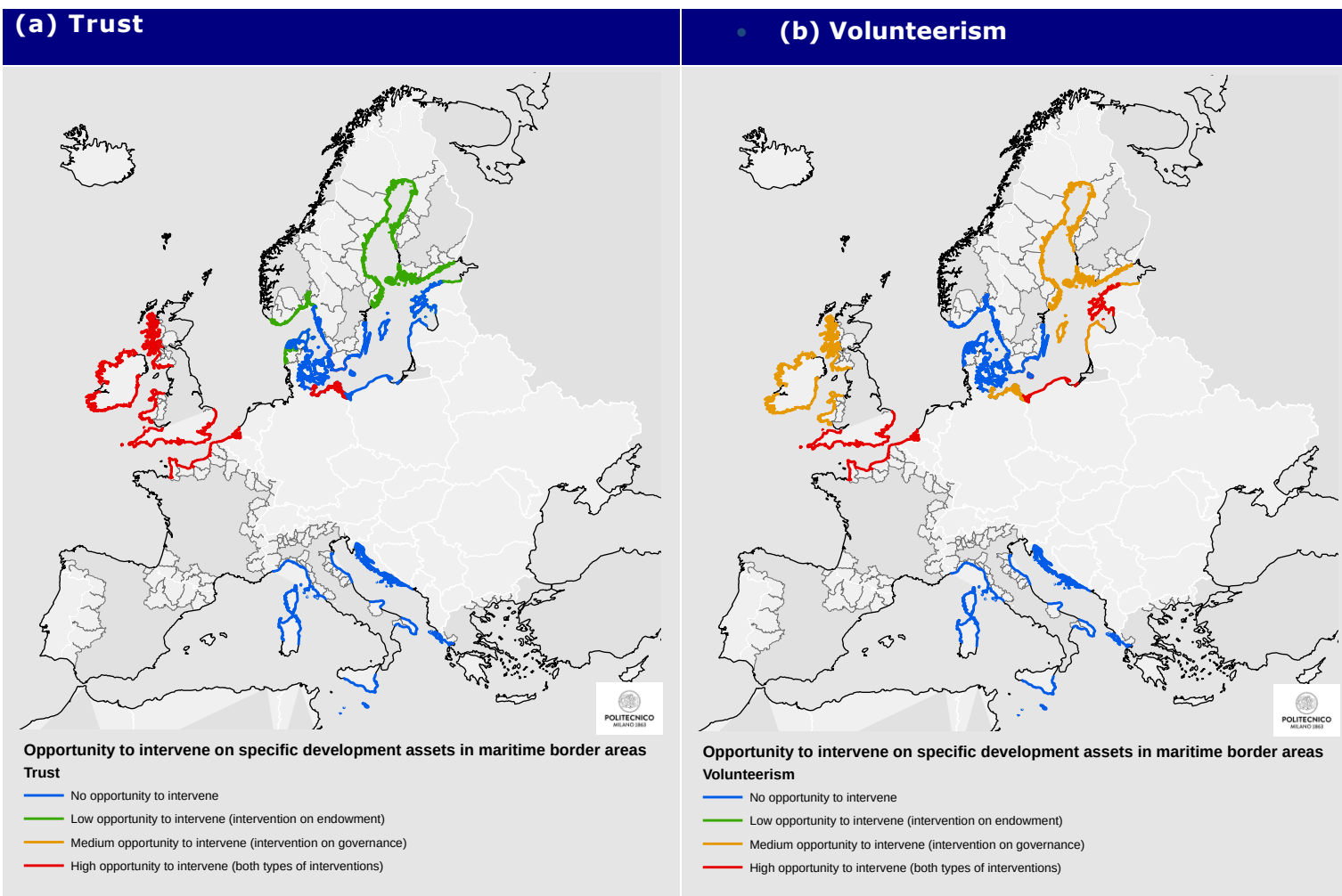
Map 43 - Opportunity to intervene for social cohesion goal: land border areas (social and human capital)



Map 44 - Opportunity to intervene for economic growth goal: maritime border areas (competitiveness)



Map 45 - Opportunity to intervene for social cohesion goals: maritime border areas (Social and human capital)



ANNEX 4: METHODOLOGY APPLIED IN SECTION 5 OF THE REPORT

The methodology applied in section 5 allows:

- (1) identification of the **actual endowment needs** of border regions, starting from the list of potential needs set out in first part of the study;
- (2) the measurement of the loss of economic growth and social cohesion due to the presence of a border that prevents resources to be fully tapped, i.e. to identify **efficiency needs**.

It therefore allows the needs of an area to be identified, as well as the number of opportunities to intervene.

The methodology for identifying actual endowment needs and efficiency needs is the following.

First, based on an indicators database built at the NUTS3 level (on growth potentials and border obstacles) identified in inventory of needs, border regions are analysed by comparing their growth potential endowment and social, institutional and physical obstacles with those of non-border regions. This analysis identifies their specificities as compared to all other EU regions. When an endowment of a specific type of growth potential (resource/asset) in border-regions is statistically lower than that of all other regions, an endowment need is identified.

Secondly (step 2), the methodology looks for the efficiency in the full use of growth assets in border regions as compared to all other regions. This result is achieved by applying econometric analyses that are able to envisage 'cause-and-effect' relationships between a dependent variable and independent ones. In this specific case, two distinct models have been estimated; one for each policy goal taken into consideration. Therefore, two distinct, dependent variables are taken into consideration. Economic cohesion is measured as the annual GDP average growth rate between 2008 and 2013. Secondly, social cohesion is measured through individual life satisfaction. The independent variables are the indicators of resources contained in the database.

The econometric models are run for all NUTS3 regions in Europe, and for those NUTS3 levels belonging to a border region as defined in the study (couple of countries). The difference in the results between the way in which a growth potential is exploited by the entire NUTS3 in Europe and by all NUTS3 border regions provides a comparison with the full use of a growth potential due to the presence of a border. If border regions exploit growth assets relatively less than all other regions in Europe, an efficiency need is identified.

Furthermore, by inserting the endowment of assets in nearby regions, the methodology is able to highlight whether border regions can remedy their lack of internal growth potential by exploiting nearby regions' assets (cross-border compensation effects), or if the presence of a border hampers the exploitation/valorisation/full use of nearby resource assets (absolute border effects). The same approach is applied to all types of borders, so as to

highlight the specific obstacles that border regions have in fully using nearby resources.

The methodology has some limits that are mainly related to the availability of data and indicators associated to the needs. In fact, the methodology requires data at NUTS3 level, and some of them are not available across the EU. There is important quantitative information missing on socio-economic data, such as industrial and functional specialisation, that are strategic, i.e. in order to identify a smart specialisation.

The table below demonstrates the loss of socio-economic growth when a border prevents full exploitation of resources. Economic growth could be 0.30% higher if the border does not prevent full exploitation of cultural events. Economic growth could be 0.64% and 0.33% higher if there is no obstacle present at the border preventing the full exploitation of industrial activities and saving propensity, respectively. Social cohesion could be 0.31% higher without obstacles preventing the full potential of internal trust, and 0.17% higher in the case of 'volunteerism' in associations.

Table 13 - Loss of economic growth and social cohesion due to the border preventing full exploitation of resources

Untapped economic resources	Loss of economic growth
Cultural events	0.30%
Presence of industrial activities	0.64%
Saving propensity	0.33%
Untapped social resources	Loss of social cohesion
Trust	0.31%
Volunteerism in social associations	0.17%

Legend: values represent the lower GDP growth (in percentage terms) due to a border preventing resources from being fully exploited.

ANNEX 5: PROPOSAL FOR NEW INDICATORS

Table 14 – New indicators

Category of need	New indicator	Type of methodological development	Cost of development	Source of data and/or methodological development
Physical obstacles	Number and types of roads crossing the border, using road network data	New indicator The indicator does not exist as such, but it can be developed by extracting free data on types of roads: motorway, trunk, primary, secondary.	Low	Openstreetmap.org
	Analysis of information on real-time traffic via mobile phone application	New indicator Substantial methodological development is needed since this source has not been explored yet.	Difficult to assess; probably high	Mobile phone application
	Identification of traffic bottlenecks in public transport along the border	Existing indicator but development is needed The creation of this indicator requires both the collection of existing data and the development of missing data using the same methodology.	Moderate	Pilot conducted in the Öresund region, see http://www.orestat.se/sites/all/files/tillganglighetsatlas_se_webb.pdf .
Normative and institutional obstacles	Number of cross-border agreements between institutions	New indicator Methodological development is needed in terms of typology of agreement and institutions to be included in the sample for a survey.	High	New survey needed
	Difference in institutional competence and approaches across the borders.	New indicator Methodological development is needed in terms of typology of institutional structure and classification of all Member States according to this typology.	High	New survey needed

	Number and direction of border crossings by emergency vehicles and/or patients.	New indicator Methodological development is needed in order design a suitable survey.	High	New survey needed
	Potential flood risk for European cities from heavy rainfall	Existing indicator but development is needed The data exists, excluding Croatia. The main development to be performed corresponds to aggregating the existing data at NUTS3 level.	Low	European Environmental Agency: report 2/2012 'Urban adaptation to climate change in Europe': map 2.10, data table in Annex II
	Ozone – 8-hour mean target for the protection of human health.	Existing indicator; the data exists, excluding border regions in Croatia and Switzerland.	Low	European Environmental Agency Map available at: http://www.eea.europa.eu/data-and-maps/figures/ozone-8-hour-mean-target-value-for-the-protection-of-human-health
	Rural concentration of ozone indicator AOT40 for crops	Existing indicator The data exist for all EU border regions but it needs to be aggregated to NUTS3 level.	Low	European Environmental Agency Map available at: http://www.eea.europa.eu/data-and-maps/figures/rural-concentration-map-of-the-ozone-indicator-aot40-for-crops-year-6
Competitive ness potential	Origin of event visitors	Existing indicator but the current methodology is based on a survey. Developing such a method for all the EU border regions would be costly.	High	Pilot conducted in Final report of H-TTransPlan project. http://finestlink.niili.net/wp-content/uploads/2015/12/Helsinki-and-Tallinn-on-the-move.pdf

	Attractiveness based on number of views of cultural and natural heritage websites	New indicator A large amount of data needs to be collected to achieve the indicator's representativeness. Aggregation to NUTS3 level will also be needed. Additionally, it is not straightforward to analyse web pages. In fact, the number of articles per heritage site or groups of heritage sites varies significantly. Hence there is a need to find the right way to collect the data in order to develop a consistent indicator.	Moderate	Big data team, Eurostat
	Share of energy users connected to smart grids	New indicator Methodological development is needed to define smart grids and a sample of energy users for the survey.	High	New survey needed
Market integration potential	Number of searches for job offers across the border using data from web search engines	New indicator It is possible to collect data on job offers. However, at the moment there is no satisfactory way to do this. Hence, there is a need to find the best modelling tool for collecting the data.	Moderate to high	Big data team, Eurostat
	Real-time data on cross-border labour commuting using mobile phone data	Existing indicator However, development is needed. There is a number of data issues that needs to be resolved, e.g. representativeness (age, gender, etc.), coverage (networks only partially covering the total population), data access over time, etc.	Moderate to high	Silm, Ahas & Tiru (2012). Spatial mobility between Tallinn and Helsinki in mobile positioning datasets. Statistical overview. https://www.emt.ee/pictures/pil did/dokumendid/spatial_mobility.pdf

Potential from natural resources (natural and protected area)	Landscape diversity expressed as Shannon Evenness Index	Existing indicator but development is needed Data available at NUTS2 level that needs to be calculated at NUTS3 level. ⁴⁵	Low	Eurostat LUCAS 2012 http://ec.europa.eu/eurostat/statistics-explained/index.php/
Potential of integrated services for cross-border functional urban areas	Location of urban service with open-source map software or commercial alternatives. Indicate the precise location of a number of services, e.g. amenities, emergency services, leisure, sport facilities, etc.	New indicator Some data exists thanks to the contribution of active users of open source software. However, the data quality differs from one region to the other. Hence there is a need to quality check the existing data. Aggregation to NUTS3 level is also needed. The constant update of information should also be taken into consideration when developing the method to extract the data.	Moderate to high	Openstreetmap.org

⁴⁵ Eurostat LUCAS 2012 [http://ec.europa.eu/eurostat/statistics-explained/index.php/Land_cover_and_land_use_\(LUCAS\)_statistics](http://ec.europa.eu/eurostat/statistics-explained/index.php/Land_cover_and_land_use_(LUCAS)_statistics)

ANNEX 6: LIST OF STAKEHOLDERS INVOLVED IN THE STUDY

List of the eight programme authorities and ten stakeholders in cross-border organisation consulted in task 3 and 4.

Programme (MA)
2 Seas
Belgium (Flanders) - Netherlands
Italy-Greece
Romania-Bulgaria
Greece-Cyprus
Central Baltic programme
Poland-Czech Republic
Slovakia-Czech Republic

Organisation	Contact person
INTERACT programme	Philipp Schwartz
Mission Opérationnelle Transfrontalière	Jean Peyrony
Benelux Union	Mooren Hans
Euro Institut	Anne Thevenet
Association of European Border Regions	Guillermo Ramirez
Centre for Cross-Border Study	Anthony Soares
Eixo Atlantico do Noroeste Peninsular.	Xoan Vazquez Mao
Nordic Council of Ministers	Claes Hakansson
CESCI - Central European Service for Cross-Border Initiatives	OCSKAY GYULA
ITEM Institute for Transnational & Euregional Cross Border Cooperation & Mobility	Eva Vanooij

List of the 11 stakeholders in cross-border organisations and statistical agencies interviewed in task 6

Organisation	Person interviewed
Grande Region (Greater Region), Luxembourg, France, Belgium and Germany	Guy Zacharias, STATEC, Head of Unit, member of the working group on cross-border data
North Calotte Council, Finland and Sweden	Paula Mikkola, General Secretary
Eurostat, European level	Teodora Brandmüller, co-editor of Eurostat Regional Yearbook
StatNord, Denmark, Norway and Sweden	Therese Hedlund, Swedish contact person for StatNord, statistician at the national statistical institute of Sweden
Helsinki-Tallinn cross-border region, Finland and Estonia	Jasmin Etelämäki, Senior Adviser for Helsinki-Tallinn co-operation at City of Helsinki
Region Värmland, Sweden	Bo-Josef Erikson, Head of division Regional Development
Örestat, Greater Copenhagen Region (formerly: Öresund), Denmark and Sweden	Daniel Svärd, project coordinator Örestat, Region Skåne
ISTAT, national statistical institute, Italy	Sandro Cruciani, Directorate territorial and environmental statistics
EUROSTAT, European level	Albrecht Wirthmann, part of the Big Data Task force team
EEA, European level	Blaz KURNIK, Climate change impacts and adaptation expert + EEA forum
EUROSTAT, European level	Fernando Reis, part of the Big Data task force team

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