Beyond Commuting:
A Multi-Service Accessibility Approach to Cross-Border Functional Urban Areas

Functional Urban Areas (FUAs) are widely used units for urban and regional analysis because they better reflect the spatial reality of cities beyond traditional administrative boundaries. The most widely used FUA methodology is the EU-OECD definition (Dijkstra et al. 2019), which delineates FUAs in two main components: an urban centre defined by high-density population grid cells and a commuting zone identified through inter-municipality commuting flows. This method is limited by the availability of data on commuting flows at the local level and still relies on administrative boundaries for the definition of FUAs. However, these national FUAs are somehow not displaying the reality for people living in border regions, as some of them commute to work in the neighbouring country, while others only use services for shopping, leisure, and even healthcare on the other side of the border where it is beneficial for their daily lifes.

To sum up, the traditional classification approaches only reflect one type of interaction across the border and do not reflect the full reality of cross-border living area. Contrary to that, recent approaches have tried to extent the FUA delineation by adding a cross-border dimension, based on population and accessibility of border crossings, services and cross-border cooperation (Jakubowski et al. 2021) or actual flows of people by mobile big data (Järv et al. 2026). While these approaches represent significant methodological advances, they also face challenges, including data availability, comparability, privacy concerns, and long-term reproducibility. In particular, cross-border commuter data remain incomplete or inconsistent in many European regions (Berzi et al., 2026).

Against this background, accessibility-based approaches offer a promising complementary perspective. Rather than measuring realized flows, accessibility analysis assesses the potential to reach opportunities within defined time thresholds. For residents of border regions, the capacity to access services across the border may shape daily life as strongly as actual commuting behaviour. Moreover, service accessibility can reveal functional interdependencies that are not captured by labour market integration alone. Integrating different Points of Interest (POIs) into FUA delineation thus enables a more differentiated understanding of spatial functionality that extends beyond employment-related interactions (Niu et al., 2025).

Therefore, we pick up the call of Churski et al. (2025) to integrate socio-economic and accessibility data into the delineation and classification of different FUA at the cross-border level. We develop a multi-service accessibility framework for identifying potential cross-border functional areas. Our approach conceptualizes functional integration not as a single-dimensional phenomenon, but as a multi-layered structure composed of distinct service-related interactions. We explore how different services generate different spatial configurations of accessibility and potential interaction.

We use a rapid realistic rooting tool (Pereira et al. 2021) to calculate accessibility for selected POIs in three key service categories: healthcare facilities, leisure and cultural amenities, and large shopping agglomerations. These categories were chosen because they represent essential, semi-essential, and discretionary services, thereby capturing different dimensions of everyday life. For each category, accessibility is calculated under different modal assumptions, including private car and public transport scenarios. Time thresholds are applied to identify

catchment areas and to assess which population groups can realistically reach specific services.
In addition, we incorporate demographic differentiation to examine whether certain age groups—particularly elderly residents and young people—face disadvantages in cross-border accessibility. This enables a more socially nuanced interpretation of functional integration. By disaggregating service types and population groups, we identify overlapping and diverging spatial patterns of potential cross-border functionality.

The French–German border serves as a particularly suitable case study. This region exhibits a long history of cross-border cooperation, yet remains characterized by different national planning traditions. On the German side, the central-place system structures spatial planning hierarchies, whereas on the French side, the concept of *bassins de vie* defines functional living areas. These approaches differ conceptually and institutionally, complicating the development of a shared territorial understanding (BBSR/ANCT, 2023). Moreover, previous analyses of cross-border functional areas in the region—such as those conducted by ESPON (2024) and the Mission Opérationnelle Transfrontalière (MOT, 2024)—have combined subjective stakeholder assessments with selected quantitative indicators. These studies provide a valuable reference framework for evaluating the added value of our multi-service accessibility approach.

The first results show that there are multiple potential cross-border functional areas, depending on the services and modal split. We will compare our results with existing national classifications and also subjective perceptions of planners which we collected during ESPON workshops in the Eurodistricts Saar-Moselle and Oberrhein. Besides the spatial differences which were drawn from stakeholders from both sides of the border on different topics, transport infrastructure shapes the perception of space, especially if physical barriers like rivers influence the number of border crossings. With our results, we will create an overlay of objective and subjective accessibility and usage and where data-driven cross-border functional areas overlap with subjective realities and where not. During the conference we will present our latest findings, and what to infer from variations regarding the accessibility of cross-border services and the perceived reality of cross-border functional areas.

In conclusion, this study contributes to the ongoing debate on redefining functional areas in cross-border contexts. By moving beyond commuting-based definitions and integrating multi-service accessibility analysis, we provide a more comprehensive perspective on cross-border functionality. Rather than replacing existing FUA methodologies, our approach complements them by adding a service-oriented dimension that captures everyday life beyond labour market integration. Ultimately, incorporating such perspectives into planning practice could support more inclusive and territorially sensitive cross-border governance, thereby improving quality of life for residents on both sides of national borders.

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