Justification for each component of the typology

INDICATOR / CATEGORY	DESCRIPTION AND RATIONALE
	To meet future urban mobility challenges, cities will benefit from sharing experiences and drawing on lessons learnt from the pathways that more mature cities have followed. The SUMP-PLUS city typology captures the different context of cities, based on demographic, geographic and socio-economic data, and enables comparison and progress tracking against other European cities in their adoption of mobility measures. *This typology helps cities to benchmark their progress against comparable European cities and, thus, to facilitate the follower cities' involvement in the replication process.*

In order to fully reflect the complex nature of the functioning of European cities, indicators, grouped into levels and categories, need to be incorporated into this new city typology, to allow for clear identification of each city's readiness level and opportunities for developing mobility transition pathways.

Each European city is unique in many ways, but groups of them share certain characteristics that enable fruitful comparisons and sharing of experiences. Drawing on a comprehensive international literature review and a further analysis of the SUMPs-UP European city survey data, the following two-level city typology has been developed, based on quantitative indicators, supplemented by a set of largely descriptive categories.

Proposed Level 1 indicators: City population size and location within regions of Europe.

The population size of a city is a crucial differentiator in the European cityscape. Whether small, medium or large, cities within each cluster tend to face a similar scale of problems and types of solutions that might be appropriate.

Differentiating cities by regions incorporates the dimension of mobility cultures and lifestyles, capturing broad mobility behaviours and attitudes towards certain policy interventions and trends, as well as reflecting their stage of economic development.

Proposed Level 2 indicators: population density, GDP (PPP) per capita and car modal share and historical trend.

Denser cities afford their citizens better local access to jobs, goods and services, on foot and by bicycle, and are more likely to support high-frequency public transport services, competitive with the private car; leading to less delays for most journeys and fewer carbon emissions. GDP per capita (purchasing power parity adjusted) represents the level of municipal resources available to provide for the basic and complex needs of its citizens, including mobility needs.

Car modal share, and whether this is increasing or declining, provides a good indication of a city's situation on the path to promoting sustainable urban mobility.

The **Categories** add a further level of qualitative variables that characterise cites in terms of their main economic functions, sub-regional spatial context, their mobility-related policy priorities, degree of local government autonomy and degree of planning capacity. This helps

to fine-tune the likely transferability of experiences between one city and another, in relation to Transition Pathways, Cross-sectoral Links, and New Solutions & Business Models.

	LEVEL 1
CITY SIZE (POPULATION)	Population size is an important, first-order indicator when comparing cities across Europe. It serves as a proxy for the scale of mobility demands and movement patterns, range/scale of land use provision, the intensity of mobility-related problems to be addressed and the scale and types of mobility solutions that might be appropriate.
REGION OF EUROPE	The region of Europe is the second level-one indicator that broadly reflects different mobility cultures across Europe. "Mobility cultures" are defined as "specific socio-cultural settings consisting of travel patterns, the built environment and mobility related discourses, i.e. they are defined by both the material and the socially-constructed dimension of the transport system." (Haustein & Nielsen, 2016). Issues like social attitudes toward public transportation, or the social stats tied to car ownership, represent potential barriers that could be acutely challenging for transportation planners. This indicator also reflects the skills and technical capacity in a city, and historical legacies such as level of economic development, timing of the onset of mass motorisation and the introduction of a sustainable urban mobility policy paradigm.

	LEVEL 2
POPULATION DENSITY	The indicator describes the number of inhabitants per km^2 of municipal land area. It correlates with the intensity of land use provision; and with the practical and financial feasibility of providing good walking/cycling and public transport facilities. Higher population density is associated with improved accessibility to local jobs, goods and services and more strategic access to high-quality public transport services. It can also affect traffic congestion and the level of urban greenhouse gas emissions.
GDP / CAPITA (Adjusted regional GDP/capita)	This measures GDP per inhabitant at a regional level (NUTS2 or NUTS3), adjusted for purchasing power. (For example, Purchasing Power Standard, derived from Eurostat table [nama_10r_3gdp]). It represents the income level and purchasing power of the local population and is a proxy for municipal government resources. The indicator enables the users of this typology to compare the economic and financial power of cities. According to the World

	Bank, more than 80% of global GDP is generated in cities, with urban transportation being the lifeblood that makes them function, allowing people and goods to move around in ways that create economic value (Fielden, 2019).
MODE SHARE: PERCENTAGE OF RESIDENT TRIPS BY CAR, AND HISTORIAL TREND	Car modal share provides a simple measure of the extent to which a city's mobilty is built around sustainable modes of transport, with the mix of car and non-car mode shares varying greatly from one city to another. It is likely to correlate with traffic congestion, air quality and CO2 emissions; and provides an indication of the scale of change that would be required to achieve a high sustainable transport modal share. It is also important to know the trend in car modal share: a low value could both reflect a city where car ownership is low, but growing rapidly, and a city where car ownership and use are in decline. The kinds of policy interventions required would be very different in these two cases.

	CATEGORY
FUNCTION(S) OF THE CITY	This describes the primary economic sector(s) and user groups within the city, such as tourism, agriculture, industry. A city might be defined by two or more such functions. These functions will affect travel patterns in the city and the main mobility demands that need to be met (e.g. volume of freight flows). They may also provide an indication of any constraints that will affect measure implementation (e.g. narrow streets in historic towns).
SPATIAL CONTEXT	Describing the location of the city in relation to its wider Functional Urban area (FUA), this metric captures the sub-regional role of a city and its proximity to other larger or smaller cities, that affect the size of the commuting zone beyond the city. Depending on the local context, the FUA might be a city and its surrounding peri-urban area, an entire polycentric region, or another constellation of municipalities. It is important to take this wider context fully into account when developing an SUMP. The indicator is based on "population density to identify urban cores, and on travel-to-work flows to identify the hinterlands whose labour market is highly integrated with the cores". Being composed of a city and its commuting zone, FUAs encompass the economic and functional extent of cities based on daily people's movements.
CREATE STAGES	Political and public acceptability for different kinds of policies was captured in the CREATE H2020 project three-stage characterisation. Cities could find themselves predominantly operating in one of three different stages:

	• Stage 1 - planning for motor vehicles (building roads and investing in parking) • Stage 2 - planning for person mobility (investing and improving cycling and public transport service) • Stage 3 - planning for liveability and public places (promoting healthy street life, reducing car presence, building places for people)
LOCAL AUTONOMY	Grouped into three categories, this indicator draws on a standardised score representing the degree of local government autonomy, at country level in the Local Autonomy Index (Ladner et al. 2015).The Index gives all EU member states a theoretical score from 0-37, although actual values range between 12-30 (see Appendix). The Index reflects the discretion that municipal decision-makers have with respect to policymaking as well as fiscal autonomy – in essence, a broad indicator of the power of a municipality relative to regional and national administrations. This captures the governance context in which different European cities attempt to transition towards sustainable mobility.
PLANNING CAPACITY	This describes the demonstrated capacity a city has for integrated sustainable transport planning, as indicated by adoption of SUMP or other strategic mobility vision and action plan. The indicator reflects how well equipped the city planning authorities and mobility practitioners are with regard to skills and knowledge that they need to develop and implement SUMPs.