



SmartUrbanity

Deliverable 2.3

Model and Data Management System Report

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1. Executive Summary

This deliverable presents the SmartUrbanity Model and Data Management System — the data architecture and governance framework supporting perception-based accessibility analysis across the project's five pilot areas: Rome, Karlsruhe, İzmir, Lyon Metropolitan Area, and Greater Zurich Area.

SmartUrbanity treats urban accessibility as shaped by three interacting dimensions: the physical structure of the city, the experiential qualities of urban spaces, and the diverse needs and behaviours of different user groups. To represent these dimensions, the system works with two complementary data categories:

- Spatial and infrastructural data — transport networks, cycling and pedestrian infrastructure, public transport services, points of interest, and land use. Sourced primarily from OpenStreetMap, municipal GIS systems, and public transport operators; some datasets require data-sharing agreements with local authorities.
- Experiential and user-related data — behavioral, demographic, and perception data collected voluntarily from adult participants (18+) through SmartUrbanity's digital tools.

The system defines workflows for data collection, validation, storage and integration, and establishes a privacy-by-design architecture intended to support compliance with GDPR (Italy, Germany and France), FADP (Switzerland) and KVKK (Türkiye). Compliance remains dependent on pilot- and tool-specific implementation, legal-role confirmation, DPIA screening and the completion of the applicable partner documentation.

Key outputs of this deliverable are:

- a structured data typology aligned with the SmartUrbanity conceptual framework.
- standardized protocols for data collection, storage, sharing, and deletion across partners.



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- a compliance framework covering data protection laws in Italy, Germany, France, Switzerland, and Türkiye.
- Technical safeguards including encryption, pseudonymization, and role-based access control.

These outputs provide the foundation for calibrating the project's accessibility models, deploying its digital tools, and translating citizen-generated inputs into evidence for urban planning.



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2. Introduction

Purpose of the deliverable

Traditional urban accessibility assessments rely on objective indicators such as distance, travel time, and network coverage. While useful, these measures only partially capture how different people experience the city shaped by safety perceptions, physical constraints, environmental conditions, and personal habits. The 15-minute city concept, which aims to ensure that residents can reach daily needs by foot, bike, or public transport, requires a richer analytical approach that reflects this diversity. All this data (data for indicators, data from surveys, from sensors, etc.) requires a clear and evident workflow on its whole treatment, from collection to storage, use and cancellation.

Deliverable 2.3 establishes the data architecture and governance framework that makes this possible in SmartUrbanity. Specifically, it:

1. defines the data types, sources, and structures needed for perception-based accessibility modelling across the five pilot areas.
2. establishes harmonised protocols for data collection, validation, storage, sharing, and deletion.
3. specifies multi-jurisdictional compliance arrangements (GDPR, FADP, KVKK), including consent management and cross-border transfer safeguards.
4. defines technical measures for data security (encryption, pseudonymisation, role-based access control).
5. provides the compliance toolkit — Data Protection Guidelines and GDPR Compliance Information Sheet — required for pilot deployment.

Together, these outputs form the foundation for WP3 tool development, WP4 pilot implementation, and WP5 policy outputs.



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Role of D2.3 in SmartUrbanity

D2.3 is the data backbone of the project. It connects the SmartUrbanity conceptual framework to the practical operation of its digital tools and pilot activities by defining how data flow from collection through to modelling and decision support.

The system supports three main workflows:

Workflow 1 — Infrastructure and network data preparation. OpenStreetMap, GTFS, administrative GIS and pilot data are ingested, checked, harmonised and mapped to versioned SmartUrbanity spatial entities and relations.

Workflow 2 — User-contributed data preparation. Surveys, mobility records and spatial contributions are preserved in the appropriate user-data environment, pseudonymised where likability is required, and transformed into validated or aggregated analytical inputs under controlled governance.

Workflow 3 — Operational handover to the digital tools. The versioned model and configuration are retrieved by Access Lab and Access Atlas for accessibility computation and visualisation; validated analytical outputs can subsequently support DSS baseline-versus-intervention comparison. Detailed runtime implementation evidence belongs to the corresponding WP3 deliverables and is not duplicated here.

I. Interfaces with SmartUrbanity Models, Tools, and Deliverables

D2.3's outputs are consumed by, and structured to interoperate with, the following project components, models, and deliverables:

- **mobiTopp / logiTopp (Karlsruhe pilot, KIT):** consume Stream A network/scenario outputs and Stream B calibration datasets as inputs to passenger and freight travel-demand simulation.



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- **MATSim (Lyon Metropolitan Area and Greater Zurich Area pilots):** consume Stream A modelling-ready networks and baseline parameters for agent-based mobility simulation, including DRT/PT integration scenarios.
- **HAI (Human-AI Interaction) models (Lyon pilot):** consume Level 1 experiential accessibility metrics and Access Lab validation signals.
- **AA (Accessibility Analysis) Platform:** consumes Level 0-2 accessibility outputs (isochrones, catchments, opportunity indicators) computed via the perceived-network model defined in Chapter 4.
- **DSS Platform:** consumes only aggregated/anonymised Level 3 governance metrics and processed outputs from Stream A/B and external ABMs — no raw personal data is passed to the DSS, consistent with the role of the DSS described in Chapter 5.
- **Related deliverables:** D2.3 builds on D2.1 (Concept Knowledge Report) and D2.2 (Framework Blueprint); feeds D2.4 (User Insights and Design Recommendations) and D3.1-D3.3 (Citizen Engagement App, AA Platform, DSS Platform); and is governed jointly with D1.4 (ethics/DPIA templates).

SmartUrbanity socio-technical architecture / actors and tools

SmartUrbanity operates as a socio-technical system built around three interacting components:

- **Citizens** who contribute mobility data, trip experiences, and perceptions through the project's digital tools.
- **Institutional actors** — planners, transport authorities, and policy makers — who use analytical outputs to inform planning decisions.
- **Digital tools**, which enable data collection, processing, and visualization within the SmartUrbanity platform.



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Research activities transform these inputs into accessibility indicators that capture not just whether destinations are reachable, but the effort, comfort, and barriers experienced by different user groups. Engagement strategies are designed to build participation progressively across pilots. Gamification mechanisms may be introduced after the initial phase, subject to ethics and privacy review, to sustain data quality and continuity.

Pilot areas and implications

The Model and Data Management System is designed to be applied across the five SmartUrbanity pilot areas: Rome (Italy), Karlsruhe (Germany), İzmir (Türkiye), Lyon Metropolitan Area (France), and Greater Zurich Area (Switzerland). These pilots represent diverse urban, institutional, and socio-spatial contexts, providing a heterogeneous testing ground for the SmartUrbanity framework. Accordingly, the system is conceived as a flexible and scalable infrastructure capable of accommodating different data sources, governance arrangements, and regulatory environments, while preserving methodological coherence across sites.

The five pilot sites exhibit substantial variation in spatial, demographic, and infrastructural characteristics, collectively representing a broad spectrum of urban conditions relevant to the 15-minute city concept.

This diversity in settlement patterns and transport systems has direct implications for data collection strategies, spatial data availability and quality, and calibration requirements for perception-based accessibility models. Accordingly, the deliverable distinguishes a common core schema from pilot-specific ingestion pipelines and locally compliant processing arrangements.



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3. Pilot-Specific Contexts

Rome (Italy)

Lead: Movesion | **Municipality:** MXII | **Additional:** Consulta Cittadina Sicurezza Stradale, Mobilità Dolce e Sostenibilità (RRSC)

Rome focuses on mixed dense and peripheral areas facing mobility limitations due to car-oriented infrastructure. Key challenges include coordination across municipalities and service disparities. The pilot utilizes citizen-collected and open-access data to gauge willingness for sustainable mobility adoption. Data sources include open-access supply data, and accident records. Against this background, the project aims to reduce accessibility gaps and identify the concrete barriers affecting active, safe, and proximity-based mobility in Municipio XII. In parallel, it seeks to generate evidence on how citizen feedback and crowdsourced information can enhance accessibility analysis, improve the interpretation of key performance indicators, and support more inclusive and participatory planning processes.

The pilot will progressively test the Access Together App, the AA Platform, and the DSS Platform, moving from beta phases to broader deployment. Attention will also be given to the gamification layer, conceived not simply as a reward mechanism but as an engagement system designed to stimulate participation, encourage continuous interaction with the tools, and strengthen users' motivation to contribute data and feedback over time. The Rome pilot will therefore assess both the technical performance of the digital solutions and their capacity to foster meaningful user involvement across different population groups. A specific focus will be placed on the Municipio XII area, comparing the experiences of diverse users to evaluate the effectiveness of the tools under varying territorial and social conditions.



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Data Management Implications: Integration of municipal GIS with citizen-generated data; harmonized data-sharing across multiple municipalities; incorporation of safety data into accessibility modelling.

Karlsruhe (Germany)

Lead: KIT | **Municipality:** STADT Karlsruhe | **Additional:** Public Transport Authority KVV

The Karlsruhe pilot looks at how people combine walking, cycling, and public transport to reach daily destinations, and how improving connections between these modes can make the 15-minute city concept more realistic. A key focus is on understanding the gap between how accessible people feel their city is versus what the objective measurements show, and how this affects their travel choices. In addition, a particular focus is set on a thorough analysis of mobility justice and its implications for the 15-minute city concept. Further, the pilot also explores how freight deliveries interact with active mobility in urban areas and how non-motorized freight activities can be integrated in sustainable, car-free 15-minute neighbourhoods. It uses the mobiTopp and logiTopp travel demand models alongside regional household surveys to analyse both passenger and freight movement patterns.

Data Management Implications: Integration with existing mobiTopp/logiTopp modelling infrastructure: data privacy preserved through synthetic data; multi and intermodal transport data integration; data exchange protocols with SmartUrbanity's digital toolkit.

İzmir (Türkiye)

Lead: EGE | **Municipality:** İzmir Metropolitan Municipality (IMM)

The Izmir pilot focuses on analysing pedestrian safety and accessibility in districts with high pedestrian density, particularly around ferry stations and major public transport hubs. Additionally, the pilot explores intelligent scheduling strategies for urban freight distribution



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and last-mile delivery to investigate how optimized logistics scheduling can enhance efficiency while reducing traffic congestion and environmental impacts. The analysis will rely on SUMP data and travel surveys to assess pedestrian safety and logistics efficiency.

Data Management Implications: Integration of mobility data derived from SUMP datasets, travel surveys, and citizen-generated pedestrian behaviour information; compliance with KVKK (Turkish Personal Data Protection Law); and cross-border data-sharing protocols.

Lyon Metropolitan Area (France)

Lead: ENTPE | **Municipality:** Metropole of Lyon (MGL)

The goal of the pilot in Lyon is to identify enablers and barriers to active travel in various urban settings, considering also eco-factors, test and validate SmartUrbanity's digital toolkit, including Human-AI Interaction (HAI) models with urban planners and mobility experts from the Metropole of Lyon (MGL), and assess the effect of weather and/or air quality on accessibility. The pilot uniquely incorporates climate and air quality data (temperature and air quality) into accessibility analysis.

Data Management Implications: Real-time environmental data integration; specialised data structures for HAI interaction logging; climate-adaptive accessibility calculations.

Greater Zurich Area (Switzerland)

Lead: ZHAW | **Municipality:** Greater Zurich Area | **Collaborating Partner:** PostAuto

Greater Zurich Area represents a low-density rural region with very high car dependency. The pilot focuses on integrating on-demand Demand-Responsive Transport (DRT) services with traditional fixed-route public transport (PT) to enhance accessibility in dispersed settlement areas. It utilizes Synthetic population, Swiss Federal Statistical Office mobility data, and PostAuto operational data.



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Data Management Implications: Integration of operational DRT data from PostAuto; flexible routing and virtual stop representation; compliance with FADP (Swiss data protection); scenario modelling for on-demand services.

Data Management System Implications across all pilots

The heterogeneity of pilot areas requires the Model and Data Management System:

- **Support Multi-Jurisdictional Compliance:** Ensure adherence to GDPR (Italy, Germany, France), FADP (Switzerland), and KVKK (Türkiye) through harmonized consent management and cross-border transfer protocols.
- **Accommodate Heterogeneous Data Sources:** Integrate diverse data types including OpenStreetMap, municipal GIS, operator data, household surveys, synthetic populations, and real-time environmental data.
- **Enable Flexible Model Calibration:** Support pilot-specific parameterization while maintaining methodological coherence across sites.
- **Facilitate Cross-Pilot Learning:** Standardized data schemas enable systematic comparison of pilot experiences and transferable policy recommendations.

Beyond the five pilot areas, the mobile app (Access Together) will also be deployed in Budapest (Hungary) to support replication and testing in an additional context.



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4. Conceptual and Data Framework

SmartUrbanity analyses urban accessibility through three interacting dimensions: the spatial structure of the city (networks, infrastructure, services), the experiential qualities of urban spaces (safety, comfort, environmental conditions), and the user-related dimension (the diverse capabilities, constraints, and perceptions of different population groups). The Model and Data Management System translate these dimensions into a structured five-step analytical framework, described below.

The five-step framework

Step 1 — Urban Structure

The city is represented as a hybrid network–area system comprising street and transport networks (links and nodes), spatial cells and land-use units, points of interest (POIs) and services, and infrastructural and environmental attributes. Two attribute types are distinguished: **link-level attributes** (intrinsic to a street segment, e.g., slope, surface quality, lane count) and **area-level attributes** (characterising the surrounding zone, e.g., perceived safety, thermal comfort, noise).

Step 2 — Behaviour and Experience Integration.

Empirical data from the project's digital tools — GPS traces, trip ratings, geo-located perception reports, and survey responses — are compared with modelled accessibility outputs. This identifies gaps between potential and lived accessibility and provides the basis for calibrating and validating model parameters.

Step 3 — Perceived Network Modelling.

The physical network is transformed into a **perceived network** by computing a traversal cost for each arc that combines physical effort (baseline travel time adjusted for infrastructure and user ability) and psychological effort (perceived burden from contextual attributes). Area-level attributes are projected onto arcs proportionally to



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spatial overlap, so that arcs traversing multiple zones reflect a weighted combination of their contexts. The result is a user-, mode-, and scenario-specific cost structure that drives perceived shortest-path computation.

Step 4 — Accessibility and Opportunity Computation.

Using perceived shortest paths, the framework derives isochrones and catchment areas, reachability metrics across multiple time thresholds, and opportunity indicators — the number and type of services reachable within given perceived travel times. Proximity is thus defined not just as distance, but as access to meaningful urban functions under realistic, user-specific conditions and perceptions.

Step 5 — Decision Support and Governance Intelligence.

Analytical results are translated into scenario comparisons and planning evidence, supporting evaluation of infrastructure interventions and their equity impacts across user groups. This positions SmartUrbanity not only as an analytical model, but as a decision-support platform for urban and mobility planning.

Perceived network modelling: formal definition

To compute accessibility indicators for a user profile u , travel mode m , and time scenario s , SmartUrbanity applies an arc-based least-cost path algorithm over a directed graph defined by:

- N : nodes representing decision points (intersections, transfer points, stations).
- A : arcs representing feasible movements (street traversal, transit boarding/alighting).
- M, S, U : sets of travel modes, time scenarios, and user profiles.

Perceived traversal cost

For each arc $a \in A$, travel mode $m \in M$, user profile u , and time scenario s , SmartUrbanity defines a perceived traversal cost that integrates physical and experiential dimensions of mobility.



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The perceived traversal cost $c(a \mid u, m, s)$ is decomposed into:

- a **physical effort component** (time-equivalent travel cost), baseline travel time adjusted for user mobility ability and infrastructural attributes.
- a **psychological effort component** (time-equivalent travel cost), perceived burden from contextual User eXperience (UX) attributes.

Baseline travel time and time scenarios

For walking and cycling, baseline time $t_{a,s}^0$ is derived from arc geometry and free-flow speeds (OSM). For public transport, it incorporates scheduled travel times, dwell times, and expected waiting times (GTFS). Values are held constant within a time scenario (e.g., peak morning, winter night) but may differ across scenarios to capture systematic variation in speeds, frequencies, and waiting times. Scenario definitions are harmonised across pilots.

UX attribute set: link-level vs area-level

SmartUrbanity defines a set of UX) attributes partitioned into two categories: **link-level attributes** and **area-level attributes**.

- **Link-level attributes** measured directly at street-segment level: slope (from Digital Elevation Model, DEM), surface quality, street width, sidewalk presence, bike lane type, lane count (sources: OSM, municipal GIS, verified citizen reports).
- **Area-level attributes** characterising the surrounding zone: perceived safety (day/night), thermal comfort, social vitality, noise, air quality, urban aesthetics (sources: citizen ratings, environmental datasets).

Area-level values are projected onto arcs through a length-weighted spatial exposure mechanism: if an arc intersects multiple spatial cells, its contextual value is the weighted average of those cells proportional to intersection length. Edge cases (short links, boundary effects, mixed-use cells) are handled explicitly to avoid unstable values.



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User mobility ability multipliers and UX sensitivity coefficients

User profiles are encoded through three calibrated parameter types:

- **A mobility ability multiplier** captures baseline physical capacity differences (e.g., reduced walking speed for older adults).
- **Physical sensitivity coefficients** sensitivity to infrastructural frictions (e.g., slope or kerb barriers for wheelchair users).
- **UX sensitivity coefficients** sensitivity to experiential attributes (e.g., perceived safety at night for women; shade availability for heat-sensitive users).

Parameter values are estimated from survey responses and pilot observations and validated through sensitivity analysis during model calibration.

Accessibility outputs and metrics

From the perceived network, SmartUrbanity computes, based on the findings presented in Deliverable 2.1:

- **isochrones and catchment areas** for selected origins.
- **reachability metrics** across multiple time thresholds.
- **opportunity indicators** count and type of services reachable within perceived travel times.

Metrics are organised into four levels:

- **Level 0 - Primitive metrics (network-based):** baseline travel time, perceived link cost, shortest path, isochrone geometry, reachable opportunities. *Derived from OSM network geometry, GTFS schedules, and municipal GIS open/administrative data, no personal data involved.*
- **Level 1 - Experiential accessibility metrics:** perceived-effort-weighted accessibility, opportunity access by category, profile-specific accessibility. *Combine network data with UX attribute values and calibrated user profile parameters. UX attributes sourced from*



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environmental datasets and aggregated citizen ratings; profile parameters estimated from survey responses (pseudonymised user-contributed data).

- **Level 2 - Spatial aggregation metrics:** zone accessibility scores, equity gaps, spatial disparities, persona-based inequality. *Aggregate Level 1 outputs across spatial units and population groups. Inputs are fully derived/anonymised; no individual-level data exposed at this stage.*
- **Level 3 - Governance metrics:** inclusive access index, safety score, mobility experience score, policy impact delta. *Composite indicators combining spatial, experiential, and scenario modelling outputs. Used in the Decision Support System for planning and policy evaluation. All inputs are aggregated or anonymised prior to use.*

Behaviour and experience integration

To provide the empirical basis for model calibration and validation, SmartUrbanity combines multiple data collection sources:

- **Trip data:** Access Together records GPS traces and allows users to rate trips in terms of perceived extra time/effort.
- **Surveys:** Sociodemographic attributes, mobility preferences, and attitudes (Access Together and Access Lab).
- **Land ratings:** Geo-located feedback on public spaces — safety, comfort, accessibility with collective validation (verification and voting).
- **Service reports:** User reports on available services and perceived quality, supported by voting logic.

Observed behaviour (routes, modes, times) and subjective ratings are compared with modelled perceived costs and accessibility outcomes to identify gaps and refine sensitivity parameters iteratively.



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Data-management domains and privacy-by-design separation

For data governance purposes, SmartUrbanity distinguishes two data categories:

1. **Open & administrative data**, governed by licences and data-sharing agreements (e.g., OSM, GTFS, municipal GIS, census data).
2. **User-contributed data**, governed by informed consent, privacy-by-design safeguards, and access minimisation (GPS traces, surveys, ratings, reports)

Within user-contributed data, a strict privacy-by-design separation is applied across two storage domains:

- **Identity & Consent domain:** stores personal identifiers (such as email address or login credentials) and consent records separately from mobility and perception data. Only authorised staff may access this layer, and the applicable security controls must be documented for the deployed environment. When a participant registers, the system creates a random internal code (a pseudonymous token). The token does not directly identify the participant, but authorised re-identification remains possible through separately protected linkage information. The identity layer is not used in modelling or analytical queries. If a participant withdraws consent, linked records are handled in accordance with the applicable lawful basis, retention schedule and approved withdrawal procedure.
- **Pseudonymised Operational & Analytics domain:** mobility events, perception reports, and non-identifying profile attributes linked through pseudonymous identifiers, enabling modelling and analytics without direct identifiers.

Outputs for stakeholders and public-facing views are generated through aggregation/anonymisation rules, supporting privacy preservation and reducing re-identification risk.

The project does not collect data for commercial purposes or advertising and does not perform commercial profiling.



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5. Data Sources, Collection Channels, and Preparation

Workflow

This chapter describes how the SmartUrbanity data framework is put into practice: where data comes from, how it is collected, and how it is processed into inputs ready for modelling and analysis.

External datasets

SmartUrbanity builds its spatial reference framework from four categories of external data:

- **OpenStreetMap (OSM)** for network geometry and infrastructure attributes.
- **GTFS** (where available) for public transport stops, routes, schedules, and service patterns.
- **municipal/regional datasets** (e.g., cycling networks, zoning, crash data, street inventory, accessibility-related layers).
- **official statistics** (e.g., ISTAT and other national statistical offices) for demographic and contextual indicators.
- **additional contextual datasets** where relevant to pilots (e.g., elevation/DEM for slope, environmental layers).

Together, these sources provide the shared spatial backbone across pilots and the contextual variables required for perceived cost computation, scenario definition, and cross-pilot comparability.

Municipal and institutional datasets.

Used to enrich or validate infrastructure and safety/context indicators, such as:

- cycling network inventories and facility typologies.
- zoning and administrative boundaries.
- crash and road safety data.
- street inventories (e.g., sidewalk width, curb ramps) when provided.



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- pilot-specific layers relevant to accessibility barriers and public space quality.

Official statistics and other national sources.

Used for demographic and contextual indicators (population distributions, socio-demographic profiles, area-based statistics). Where necessary for cross-pilot comparability and modelling stability, neighbourhood-level units may be harmonised by merging into consistent analysis zones.

Additional contextual sources (pilot-dependent).

Where required by modelling design, auxiliary datasets may be used (e.g., elevation/DEM for slope; environmental context layers, national travel surveys), subject to licensing and integration constraints.

Data formats, standards, and harmonisation principles

To ensure interoperability across pilots and tools, SmartUrbanity adopts common geospatial and data exchange practices. The following are the technical formats used across all pilots to ensure data can be combined and compared consistently:

- **Geospatial formats:** GeoJSON, CSV (with geometry references), Shapefile/GeoPackage for vector layers; GTFS for transit; vector tiles for web visualisation pipelines where applicable.
- **Coordinate reference system (CRS):** consistent CRS management during processing (e.g., WGS84 for exchange and/or storage where appropriate; projected CRS for metric computations), ensuring reproducibility of distance- and exposure-based measures.
- **Identifiers and provenance:** stable identifiers for network elements, POIs, spatial units, and datasets; versioning and provenance metadata for each ingestion and transformation step.
- **Mode taxonomy and coding schemes:** consortium-wide mappings for transport modes and classification schemes to support cross-pilot comparability (e.g., walking, cycling, micromobility, public transport, motorised).



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- **Spatial units for aggregation and privacy:** adoption of consistent aggregation units (e.g., administrative zones and/or grid/hex systems) to support indicator computation, cross-scale reporting, and privacy-preserving outputs.
- **Schema conventions:** consistent field naming for core objects (network links/nodes, POIs, spatial units, scenario labels, profile labels) to reduce integration effort between modelling and visualisation components.

Pilot-specific datasets (local context enrichment)

In addition to the common datasets shared across all pilot areas, SmartUrbanity integrates a range of **pilot-specific datasets** reflecting local contexts, institutional frameworks, and available data infrastructures. Examples include road accident datasets in Rome; regional travel surveys, demand models and synthetic populations in Karlsruhe; real-time climate and environmental data (temperature, air quality); statistical registers and mobility surveys in Greater Zurich Area; and transport planning and logistics-related datasets in İzmir.

These datasets enrich the analytical framework, support model calibration, and enable context-sensitive interpretation of accessibility patterns. Their integration typically requires pilot-specific agreements, schema alignment, and interoperability checks (e.g., spatial reference consistency, temporal coverage, variable harmonisation), while preserving consortium-wide comparability through shared taxonomies and metadata.

When licensing conditions prevent redistribution, datasets are used locally within the pilot environment and only aggregated/derived indicators are propagated to cross-pilot analyses to preserve comparability.

Collection tools and channels (user-contributed data)

SmartUrbanity collects urban mobility and perception data through a mixed-method strategy combining digital tools and field-informed engagement activities. The strategy is designed to maximise interpretability and coverage while keeping data collection proportionate to project needs and compliant with applicable data protection regulations.



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This mixed-method design intentionally separates (i) continuous/passive mobility evidence (e.g., traces and trip attributes) from (ii) episodic/reflective inputs (e.g., perceptions, ratings, and deliberative feedback). Together, these streams populate the experiential layer needed to calibrate perceived cost functions and to validate accessibility outputs across user profiles and scenarios.

Mobile App: Access Together

Access Together is the primary mobile channel for collecting user-contributed mobility and perception data through structured interactions, including:

- trip-based data collection (e.g., GPS traces and time-stamped movement).
- lightweight in-app questionnaires (travel habits, preferences, perceived accessibility).
- contextual reports linked to locations and trips (optional geo-referenced comments and evaluations).
- user inputs supporting model calibration (e.g., perceived extra effort/time ratings where applicable).

The app supports repeated observations over time, enabling the estimation of user- and scenario-dependent parameters (e.g., ability multipliers and sensitivity coefficients) and supporting longitudinal monitoring when engagement is sustained.

Web platform: Access Lab

Access Lab complements the app by enabling map-based and deliberative user contributions, including:

- reporting and mapping of spatial perceptions and accessibility barriers.
- contributing to facilities/POI mapping and updates where relevant.
- exploring and commenting on interventions and scenarios provided by local administrations (where applicable).
- participating in collective validation mechanisms (e.g., verification and voting-based agreement).



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This channel integrates structured citizen knowledge into the experiential layer and ensures **traceability** of inputs for quality control and governance workflows. Aggregated validation signals (e.g., agreement levels) provide **quality assurance** for perception indicators used in modelling and dashboards.

Surveys and engagement activities coordinated with Community Connectors

SmartUrbanity uses modular questionnaires (digital and assisted, where needed) and targeted engagement campaigns to collect behavioural, perception, and evaluation variables that may not be reliably captured through passive sensing alone. These activities are coordinated with **Community Connectors** (e.g., NGOs, associations, advocacy groups) to:

- reach population groups that are underrepresented in purely digital recruitment.
- tailor outreach to pilot-specific contexts and accessibility priorities.
- support co-creation formats (workshops, focus groups, guided walks, validation sessions) that complement digital contributions.
- improve interpretability of perception data by grounding indicators in lived experience.

Campaigns may be time- and location-specific (e.g., focusing on specific corridors, neighbourhoods, or service categories) to strengthen spatial coverage and to target policy-relevant issues.

Workshops and Focus Groups

SmartUrbanity conducts structured workshops and focus groups in pilot areas to gather qualitative insights, validate user requirements, and support model calibration. These in-person and online sessions complement digital data collection by enabling direct dialogue with citizens and stakeholders.

Workshop and focus group participants may provide information through structured questionnaires and consent forms, including:



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- identification and contact (for consent and if follow-up is required): name, organisation (where relevant), email address, signature (consent).
- demographic attributes (optional): year of birth, gender identity, education level.
- other information related to mobility behaviour, engagement, and digital practices: vehicle types and usage frequency, typical commute duration, navigation apps used and frequency, and missing features in existing mobility applications (open-ended).

Workshop and focus group data contribute to:

- (i) user persona development.
- (ii) plausibility checks and model validation.
- (iii) refinement of tool requirements; and
- (iv) optional recruitment of consenting participants for app testing or GPS-trace collection.

Data categories collected via digital tools

Data collected through SmartUrbanity tools are organised into categories reflecting both analytical purpose and data protection implications. The categories below are indicative and may be implemented with pilot-specific variations; collection follows data minimisation principles and is limited to what is necessary for modelling and analysis.

The categories, their personal data flags, primary purposes, and handling domains are summarised in Table 1 below.



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Table 1: Data Categories Collected via SmartUrbanity Digital Tools

<u>Data category</u>	<u>Examples</u>	<u>Personal data flag</u>	<u>Primary purpose</u>	<u>Handling domain</u>
Access / account data	Email (if used), authentication credentials (stored as salted/hashed secrets or via trusted identity provider), account preferences	Direct identifier	Authentication, account management, consent management	Identity & Consent domain
Consent and participation records	Consent status, timestamps, withdrawal records, participation preferences	Linkable to identity	Lawful basis documentation, ethical governance, audit trail	Identity & Consent domain
Location data	GPS coordinates, timestamps, sampling intervals	High re-identification risk	Trip reconstruction, calibration, exposure/context linking	Pseudonymised Operational & Analytics domain
Travel data	Routes, trip segments, mode labels, trip attributes (duration, distance, transfers)	Behavioural (pseudonymous)	Modelling inputs, validation, indicator computation	Pseudonymised Operational & Analytics domain
Survey data	Travel habits, preferences, perceived accessibility, pilot-specific questions	Potentially sensitive by inference	Profiling into user groups, behavioural modelling, evaluation	Pseudonymised Operational & Analytics domain (minimised)
Contextual perception reports	Geo-referenced comments on safety, infrastructure issues, positive experiences	Free-text content risk (and image risk where enabled)	Experiential layer indicators, qualitative validation	Pseudonymised Operational & Analytics domain (with content moderation / minimisation)
Collective validation actions	Verification/voting signals associated with reports or mappings	Linkable behavioural signal (within system)	Consolidation of shared experiential patterns, quality control	Pseudonymised Operational & Analytics domain
Technical metadata	Device type, app version, browser, timestamps for stability/deduplication	Potentially identifying in combination	System stability, fraud and deduplication prevention, QA	Pseudonymised Operational & Analytics domain (restricted access)

Governance statement. The project does not collect data for commercial purposes or advertising and does not perform commercial profiling.

Additional notes on minimisation and risk controls:

- **Voluntary participation.** User-related information is collected on a voluntary basis via SmartUrbanity digital tools and surveys, in compliance with data protection regulations and ethical standards.
- **Adult participation (18+).** Recruitment and participation activities target adults only. Any accidental submissions by minors are not intended and will be deleted if identified, in line with data minimisation procedures.
- **Separation of identity and analytics.** The identity table is not joined into modelling or analytics queries; only the pseudonymous token propagates across the analytics layer. This separation reduces exposure to direct identifiers but does not make the analytics records anonymous: they remain pseudonymised personal data whenever authorised re-identification is reasonably possible.
- **Location and time generalisation.** Where required for sharing or publication, location and time data are transformed through aggregation and generalisation (e.g., spatial units, time bins, minimum-count thresholds) to reduce re-identification risk.
- **Free text controls.** Where participants can submit free-text reports, collection interfaces encourage short, structured inputs. All free-text entries are checked before storage to remove unnecessary personal information.

I. Canonical Data Schema: Field-Level Specification

To make the data categories in Table 1 implementable, testable, and reproducible, the table below defines representative core fields per category, including data type, mandatory/optional status, and coding scheme. This is a first-pass canonical schema aligned with the governance framework in Chapter 6; it will be finalised at technical (database/API) level jointly with WP3 tool development.



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Table 1a: Illustrative Canonical Field-Level Schema (to be finalised with WP3)

Data category	Field name	Data type	Mandatory / Optional	Coding allowed values
Access / account data	user_id (pseudonymous)	string (UUID)	Mandatory	System-generated; never user-facing
Access / account data	email	string	Optional (if used)	Stored as salted/hashed secret
Access / account data	auth_provider	enum	Mandatory	{email, SSO}
Consent and participation records	consent_status	enum	Mandatory	{granted, withdrawn, pending}
Consent and participation records	consent_timestamp	datetime (ISO 8601)	Mandatory	—
Consent and participation records	withdrawal_timestamp	datetime (ISO 8601)	Optional	Null if active
Location data	trace_id	string (UUID)	Mandatory	—
Location data	lat / lon	float (WGS84)	Mandatory	Decimal degrees
Location data	timestamp	datetime (ISO 8601)	Mandatory	—
Location data	sampling_interval_s	integer	Optional	Seconds
Travel data	trip_id	string (UUID)	Mandatory	—
Travel data	pseudonymous_user_id	string	Mandatory	FK to Stream B token
Travel data	mode	enum	Mandatory	{walk, cycle, micromobility,

				PT, motorised} — consortium mode taxonomy
Travel data	start_ts / end_ts	datetime (ISO 8601)	Mandatory	—
Travel data	distance_m	float	Mandatory	Metres
Travel data	purpose	enum	Optional	{work, leisure, shopping, other}
Survey data	survey_id	string	Mandatory	—
Survey data	question_code	string	Mandatory	Consortium- wide survey coding scheme
Survey data	response_value	string / numeric	Mandatory	Per question type (e.g., Likert 1-5, categorical, free text)
Contextual perception reports	report_id	string (UUID)	Mandatory	—
Contextual perception reports	category	enum	Mandatory	{safety, comfort, infrastructure, other}
Contextual perception reports	geolocation	point (WGS84)	Mandatory	—
Contextual perception reports	free_text	string	Optional	Moderated and minimised before storage
Collective validation actions	validation_id	string	Mandatory	—

Collective validation actions	target_report_id	string	Mandatory	FK report_id to
Collective validation actions	vote_value	enum	Mandatory	{confirm, dispute}
Technical metadata	device_type	string	Optional	—
Technical metadata	app_version	string	Optional	—
Technical metadata	session_ts	datetime (ISO 8601)	Optional	—

Data preparation workflow

Data preparation transforms raw inputs into harmonised datasets suitable for modelling, calibration/validation, and analytics across the five pilot cities. The workflow is organised into two complementary streams:

- (i) preparation of infrastructure and network data for model inputs, and
- (ii) preparation of user-contributed behavioural and perception data with privacy-preserving processing.

Both streams maintain dataset versioning, processing logs, and provenance metadata. This ensures results are reproducible, comparable across pilots, and properly documented for compliance reporting.

Stream A - Infrastructure and network data preparation (model inputs)

Stream A prepares heterogeneous infrastructure and network sources through quality checking, harmonisation and mapping to the common SmartUrbanity spatial entities



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and relations. The resulting versioned model input provides the spatial foundation consumed by the WP3 digital tools. This deliverable defines the preparation logic and data-management boundary; repository structure, runtime implementation and technical evidence are documented in WP3. The configured pilot bounding box is applied as a hard spatial cut during ingestion: features outside it are not loaded, and geometries crossing its boundary are clipped so that only the portion inside the configured extent enters the model.

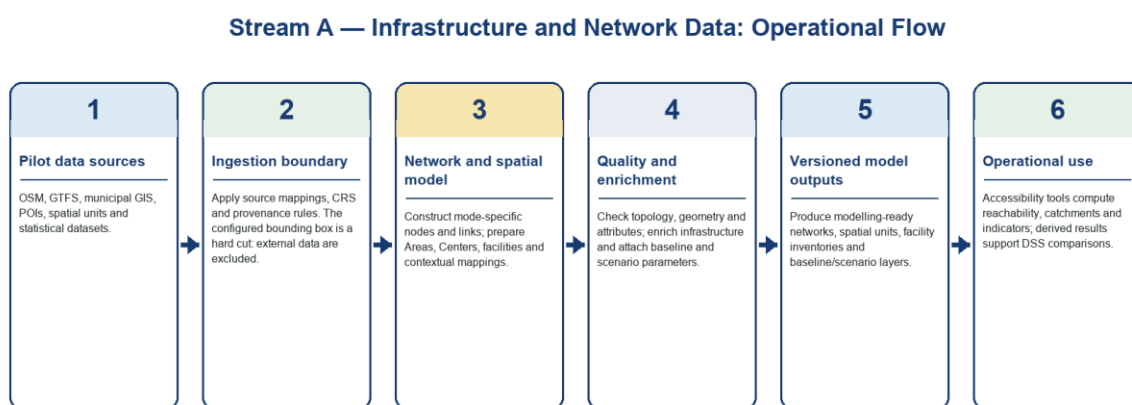


Figure 1: Operational scope of Stream A and its handover to the WP3 digital tools

Within the reviewed Accessibility Analysis Platform prototype, implemented through Access Lab and its Access Atlas analytical component, the demonstrated workflow covers preparation and loading of OpenStreetMap-derived network data, construction of the routable graph, representation of link-level infrastructure properties, public-transport structures derived from configured sources, and spatial processing for accessibility computation, catchment generation and Opportunity indicators. Municipal GIS and pilot-specific layers can be incorporated through the model-preparation workflow. Provenance, coordinate-reference-system harmonisation and quality controls must remain explicit for every source. Pilot-

specific or NDA-protected datasets remain under the responsible partner's local governance and are transferred only through the agreed interface and at the minimum level of detail required. Detailed implementation evidence, screenshots and test records are maintained in the corresponding WP3 deliverable package rather than duplicated in D2.3.

The six-step workflow for Stream A is detailed in Table 2 below.

Table 2: Stream A – Infrastructure and Network Data Preparation Workflow

No	Step	Description
1	Ingestion and schema alignment	Import OSM, municipal GIS layers, GTFS, POIs, spatial units, and statistical datasets. Align schemas and identifiers; document provenance and licensing constraints.
2	Network construction and enrichment	Build multimodal graphs (mode-specific where relevant) from network geometry. Enrich network links with infrastructure attributes used in perceived cost functions (e.g., slope, surface, facility presence) where available.
3	Spatial units and contextual mapping	Prepare administrative units and/or grid/hex tessellations for aggregation and scenario analysis. Map POIs/facilities to categories and harmonise classifications across pilots where possible.
4	Quality checks (spatial integrity and consistency)	Validate topology (connectivity, isolated components, invalid geometries). Check attribute completeness, plausibility ranges, and internal consistency (e.g., missing key tags, invalid speeds, geometry errors).
5	Scenario labelling and baseline parameters	Attach scenario labels (time-of-day/season categories used in modelling) where applicable. Prepare baseline travel-time components (e.g., free-flow estimates for walk/cycle; scheduled/waiting components for transit based on GTFS).
6	Outputs	modelling-ready network datasets (nodes/links by mode). POI/facility inventories by category. spatial units (zones/cells) and crosswalks. baseline parameters and scenario-specific layers.

Stream B - User-contributed data preparation (privacy-preserving analytics inputs)

This workflow handles data collected from participants through the Access Together app (CEA) and the Access Lab web platform. It covers all steps from raw collection to analysis-ready outputs, making sure personal data is protected throughout.



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Stream B — User-Contributed Data: Operational Flow

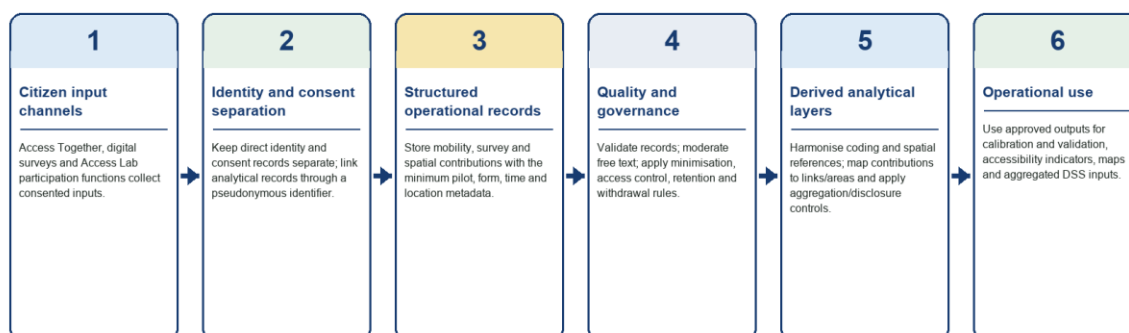


Figure 2: Operational scope of Stream B and its handover to modelling, Access Lab and the DSS

The process works as follows. When data arrives — such as GPS traces, survey answers or perception reports — direct identifiers are separated and the analytical records are associated with an internal pseudonymous token. The data is then checked for quality (for example incomplete trips, unrealistic speeds or spatial jumps) and prepared for analysis (for example calculating trip duration, identifying travel mode and assigning spatial zones). Survey and mobility records may be linked through the pseudonymous token, never through direct identifiers in the analytical workflow. Free-text inputs require appropriate screening and minimisation. Aggregation does not automatically constitute anonymisation: an output is described as anonymised only after the applicable disclosure controls and re-identification-risk assessment have been completed.

Role of the Decision Support System (DSS): The DSS does not collect any data directly. It only uses processed outputs from Stream A and Stream B — such as accessibility indicators, scenario results, and anonymized behavioral summaries. In some pilots, outputs from external travel demand models (e.g., mobiTopp) are also used. No raw personal data is ever passed to the DSS.

The steps of Stream B are outlined in Table 3 below.

Table 3: Stream B – User-Contributed Data Preparation Workflow

No	Step	Description
1	Secure ingestion and domain separation	When a participant registers, the system generates a random pseudonymous identifier (token). This token has no semantic link to the participant's identity and is the only connection between the two storage domains: - Identity and consent records (name, email, consent status) are stored in the Identity & Consent domain, accessible only to authorized personnel responsible for participant management. - Mobility events, surveys, and reports are stored in the Pseudonymized Operational & Analytics domain, referenced by the token only — no personal identifiers are stored alongside them.
2	Validation and quality checks (records and behavioural plausibility)	Detect incomplete records, inconsistent timestamps, duplicated submissions, and obvious outliers. Validate GPS plausibility (e.g., unrealistic speeds, spatial jumps) and trip segmentation quality where applicable.
3	Harmonisation and standardisation across pilots	Align variables and coding schemes (e.g., transport mode taxonomy, survey encoding, report categories). Harmonise spatial references (mapping to network, zones, and/or grid/hex units).
4	Privacy-preserving transformation	Apply pseudonymisation, minimisation, and (where needed) generalisation prior to sharing or publication. Convert fine-grained location traces into derived representations, when possible (e.g., aggregated indicators, map-matched segments, cell-based summaries), applying thresholds to reduce re-identification risk. Raw trace-level data are not propagated beyond the pilot environment unless strictly necessary; cross-pilot sharing relies on aggregated or otherwise disclosure-controlled representations.
5	Preparation for modelling and analytics	Produce calibration datasets (e.g., GPS traces + perceived effort ratings; behavioural patterns) to estimate user ability multipliers and sensitivity coefficients in the perceived effort model; complemented by Access Lab reports and collective validation signals where applicable. Produce experiential indicator layers (e.g., aggregated perceptions at link/area level), consolidated through collective validation mechanisms. Prepare analytics-ready datasets for visualisation and reporting (e.g., aggregated accessibility indicators by area/profile/scenario).
6	Outputs	pseudonymised mobility and survey datasets suitable for calibration/validation. consolidated experiential indicators mapped to links and/or areas. aggregated, privacy-preserving datasets for dashboards, maps, and reporting.

Pilot-specific objectives and external model links

The following summary clarifies the pilot focus and where external modelling environments may be coupled with SmartUrbanity outputs:

Table 4 below summarises the pilot focus and potential external model linkages for each city.

Table 4: Pilot-Specific Objectives and External Model Linkages

<i>Pilot City</i>	<i>Pilot Objective</i>	<i>Focus / potential external model linkage</i>
Rome (Italy)	Use citizen-collected and open-access data to gauge willingness to adopt sustainable behaviours	Behavioural willingness; integration with safety/open datasets
Karlsruhe (Germany)	Enhance active mobility including a more attractive access/egress to PT; Reduce motorized urban parcel transport	Behavioural willingness; First/last mile parcel transport + integration with mobiTopp/logiTopp
İzmir (Turkey)	Identify barriers to 15-minute city and improve pedestrian safety near highways; support walking/biking engagement	Walkability + safety near highways; linkage to local planning models where available (pilot-specific)
Lyon (France)	Identify enablers/barriers to active travel considering environmental factors (wind, temperature, air quality)	Active mobility + climate context; MATSim + HAI test site
Greater Zurich Area (Switzerland)	Improve PT accessibility in rural areas by integrating on-demand services	Hub-and-spoke DRT + PT integration, linked to MATSim; PostAuto operational datasets

6. Legal, Governance and Data Protection Framework



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Data requirements for modelling are defined in Chapters 4 and 5 (conceptual layers and collection channels). This chapter focuses on the legal, governance, and privacy-by-design framework ensuring that these inputs can be processed and shared safely across pilots.

The Model and Data Management System was developed through: (i) definition of modelling use cases and data requirements per pilot; (ii) analysis of applicable legal frameworks of respective partner countries (GDPR, FADP, KVKK); (iii) partner consultation on planned data collection and safeguards; and (iv) consolidation into a common handling framework with standardised protocols and compliance tools.

Purpose and Scope of Data Processing

SmartUrbanity processes data exclusively to support perception-based accessibility modelling, participatory decision-support, and scientific evaluation.

Data processing activities pursue five core objectives:

- Support accessibility analysis and visualization across pilot areas (neighborhood comparison, persona-based exploration within Access Lab);
- Generate perception-aware mobility evidence (e.g., comfort, safety, perceived effort) to complement behavioral and spatial data.
- Develop, calibrate, and validate modelling workflows (routing, simulation, scenario analysis).
- Enable structured participatory feedback to inform urban interventions.
- Monitor engagement quality and representativeness to reduce bias and improve longitudinal robustness.

The project does not process data for commercial profiling, marketing, or advertising purposes.

Data Requirements



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SmartUrbanity models require two fundamental categories of input data, corresponding to the supply and demand sides of the urban system.

Much of the infrastructure data is publicly available. Some datasets particularly from transport operators or municipalities, require Non-Disclosure Agreements (NDAs) or formal Data Sharing Agreements.

Where such agreements apply:

- **Raw data stays local.** NDA-protected datasets are kept within the pilot partner's own environment. They are not uploaded to any shared platform or passed to other consortium partners.
- **Only derived outputs enter the tools.** The digital tools use aggregated or processed representations — such as network attributes or travel time parameters — not the raw data itself.
- **Agreements are documented.** Every NDA or DSA is recorded in the pilot's data inventory, noting the dataset name, the responsible partner, what the data may be used for, and any restrictions on sharing or publication.
- **User profile, mobility evidence, and perception data**

This category encompasses individual-level information about travel behaviour, preferences, and perceptions:

- **Travel Patterns:** Trip path with all GPS points plus metrics, departure times, travel modes used, route choices, trip purposes, and travel frequencies
- **Path and Mode Choice Preferences:** Factors influencing route and mode selection including comfort, cost sensitivity, time valuation, and thermal comfort and environmental greenery.
- **Accessibility Perceptions:** Subjective experiences of accessibility barriers, safety concerns, service quality assessments, and satisfaction levels which are based on reports on land



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- **Demographic Characteristics:** Age groups, household composition, mobility limitations, perceptions, and other attributes affecting travel behaviour (collected at individual level with explicit consent)

This behavioural data is collected voluntarily from adult participants (18+) through Access Together, Access Lab and Digital Surveys. All participants provide informed consent and can withdraw their data at any time. Gamification elements, where used, are designed to remain transparent, optional, and non-coercive.

These user-contributed mobility evidence and perception data serve three main purposes:

- **Calibration:** estimating profile parameters (ability multipliers and sensitivity coefficients) for the perceived-effort routing model using observed traces and subjective ratings.
- **Validation:** checking model plausibility by comparing perceived-cost predictions with observed routes, modes, and reported experience.
- **Scenario assessment:** supporting decision-support comparisons of interventions primarily through changes in perceived accessibility indicators; where external ABMs are used in specific pilots, only aggregated and privacy-preserving inputs are provided for system-level mobility scenario analysis.

I. Target Population, Recruitment, and Sample Size

Requirements

Target population, recruitment objectives, demographic and spatial coverage, and minimum sample sizes per pilot are being finalised in the WP4 data-collection template currently in preparation by Sapienza in coordination with WP4, and will be incorporated into this deliverable once confirmed. Interim placeholders are summarised below and will be replaced with confirmed figures.

Pilot	Target population	Recruitment objective	Demographic coverage	Spatial coverage	Minimum sample size



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Rome (Italy)	Pending WP4	Pending WP4	Pending WP4	Municipi o XII	Pending WP4
Karlsruhe (Germany)	Pending WP4	Pending WP4	Pending WP4	Pending WP4	Pending WP4
İzmir (Türkiye)	Pending WP4	Pending WP4	Pending WP4	Pending WP4	Pending WP4
Lyon Metropolitan Area (France)	Pending WP4	Pending WP4	Pending WP4	Pending WP4	Pending WP4
Greater Zurich Area (Switzerland)	Pending WP4	Pending WP4	Pending WP4	Pending WP4	Pending WP4

Multi-Jurisdictional Regulatory Context

Given the consortium composition across the EU, Switzerland, and Türkiye, SmartUrbanity operates in a multi-jurisdictional data protection context. The project therefore applies a unified compliance approach designed to satisfy the most stringent requirements across the applicable frameworks (GDPR, FADP, and KVKK).

Unified compliance strategy. To ensure consistency across pilots, the Data Management System implements a common baseline that includes:

- establishing clear controller/processor roles per processing activity.
- applying appropriate safeguards for international transfers (e.g., SCCs where applicable).
- maintaining Records of Processing Activities (RoPA), including GDPR Art. 30 documentation where applicable.
- providing multilingual privacy notices and consent forms.
- implementing technical safeguards (encryption, pseudonymisation, role-based access controls).



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- enabling data subject rights (access, rectification, erasure, portability).

Controller/processor roles are defined per pilot and per processing activity and documented within the project Records. Where joint controllership applies, responsibilities and contact points are specified in the corresponding pilot-level governance arrangements.

For the İzmir pilot, KVKK (Turkish data protection law) applies to all personal data collected from participants by EGE and IMM. In practice, this means the following:

What data is collected locally: Participant data — including travel behaviour, survey responses, and perception reports — is collected and stored within Turkey by EGE. This data does not leave Turkey in its raw or identifiable form.

What is shared with EU partners: Only anonymised and aggregated outputs — such as accessibility indicators, spatial statistics, and model parameters — are shared with other consortium partners. These outputs do not contain personal data and therefore do not trigger cross-border transfer restrictions under KVKK.

If any personal data needs to cross the border: This will only be done under an appropriate legal mechanism as required by KVKK — either explicit informed consent from participants, or Standard Contractual Clauses approved by the KVKK Authority. Any such transfer will be documented in the project's data transfer records.

Participant rights: Participants in the İzmir pilot are informed of their rights under KVKK, including the right to access, correct, and delete their data, through a privacy notice provided in Turkish before data collection begins.

The project uses gamification elements to support engagement; these are designed to remain transparent and non-coercive, preserving voluntary participation. As participation is restricted to adults (18+), child-specific consent requirements (e.g., GDPR Article 8) are not applicable.

European Union - General Data Protection Regulation (GDPR):



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The GDPR (Regulation 2016/679) establishes comprehensive requirements for processing personal data of individuals within the European Union. Personal data is defined as any information relating to an identified or identifiable natural person, including names, identification numbers, location data, and online identifiers. The GDPR imposes strict obligations on data controllers and processors including:

- Lawful basis for processing (consent, legitimate interest, public interest, contractual necessity)
- Data minimization (collecting only necessary data for specified purposes)
- Purpose limitation (using data only for stated purposes)
- Storage limitation (retaining data no longer than necessary)
- Data subject rights (access, rectification, erasure, portability, objection)
- Security measures (encryption, pseudonymisation, access controls)
- Accountability and documentation (records of processing activities, data protection impact assessments)
- International transfer restrictions (requiring safeguards for data transfers outside EU/EEA)

For SmartUrbanity partners in Italy, Germany, and France, GDPR compliance is mandatory and directly enforceable by national Data Protection Authorities.

Switzerland - Federal Act on Data Protection (FADP):

Switzerland, while not an EU member state, operates under the Federal Act on Data Protection (Bundesgesetz über den Datenschutz, revised 2020, effective September 2023). The revised FADP aligns closely with GDPR principles while maintaining Switzerland's legal independence. Key FADP requirements include:



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- Lawfulness and Good Faith: Data processing must be lawful and conducted in good faith
- Proportionality: Data collection must be proportionate to the processing purpose
- Purpose Limitation: Data may only be processed for purposes disclosed to data subjects
- Data Minimization: Only necessary data may be collected and processed
- Data Accuracy: Controllers must ensure data accuracy and update as needed
- Storage Limitation: Data must be deleted when no longer required
- Data Security: Appropriate technical and organizational measures must protect against unauthorized access
- Transparency: Data subjects must be informed about data processing
- Data Subject Rights: Rights to access, rectification, erasure, and restriction of processing
- International Transfers: Transfers to countries without adequate protection require appropriate safeguards (Standard Contractual Clauses, Binding Corporate Rules, or explicit consent)

The Swiss Federal Data Protection and Information Commissioner (FDPIC) provide oversight and enforcement. While the European Commission has recognized Switzerland as providing adequate data protection (adequacy decision), Standard Contractual Clauses may still be required for specific processing arrangements between Swiss and EU partners within SmartUrbanity.

Türkiye - Law on Protection of Personal Data (KVKK):

Türkiye's Law on Protection of Personal Data (Kişisel Verilerin Korunması Kanunu, Law No. 6698, enacted April 2016) establishes a comprehensive data protection framework inspired by EU GDPR but with distinct requirements:



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- **Explicit Consent Requirement:** Processing personal data generally requires explicit, informed, and freely given consent from data subjects. Consent must be specific for each processing purpose.
- **Sensitive Data Protection:** Special categories of personal data (race, ethnicity, political opinions, religious beliefs, health data, sexual orientation, biometric and genetic data) require explicit consent and cannot be processed without legal authorization
- **Data Controller Registration:** Organizations processing personal data must register with the Turkish Data Protection Authority (KVKK Authority)
- **Illumination Obligation:** Data controllers must inform data subjects about processing purposes, data recipients, collection methods, legal basis, and data subject rights
- **Cross-Border Transfer Authorization:** Transferring personal data outside Türkiye requires either: (a) adequate protection in the destination country (whitelist), (b) written consent from data subjects, or (c) Standard Contractual Clauses or Binding Corporate Rules approved by the KVKK Authority
- **Data Retention Limitation:** Personal data must be deleted or anonymized when processing purposes cease
- **Data Security Measures:** Technical and administrative safeguards must prevent unauthorized access, loss, or disclosure

Summary Table

Table 5 provides a comparative overview of the applicable frameworks, storage arrangements, and access constraints by jurisdiction.

Table 5: Multi-Jurisdictional Compliance Summary by Pilot Jurisdiction

Pilot jurisdiction	IT / DE / FR	CH (Greater Zurich Area)	TR (İzmir)
Applicable framework	GDPR (EU)	FADP (Switzerland)	KVKK (Türkiye)



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Data categories processed	Personal data (identity / contact, consent); Pseudonymised mobility & survey data; Aggregated / anonymous indicators	Personal data (limited); Pseudonymised mobility & perception data; Aggregated outputs	Personal data (consent-based); Pseudonymised mobility and survey data; Aggregated outputs
Primary storage location	Stored within EU (partner-controlled environments or EU-compliant cloud services)	Stored in Switzerland or EU / CH-recognised adequate jurisdictions	Stored in Türkiye under pilot partner responsibility
Cross-border transfers	Aggregated indicators may circulate consortium wide. Pseudonymised datasets shared only if necessary and under appropriate safeguards (e.g., SCCs or consortium agreements). No raw identity data transferred.	Aggregated indicators may be shared consortium wide. Pseudonymised data shared only under safeguards consistent with Swiss cross-border requirements. No identity-layer export.	Cross-border transfer of personal or pseudonymised data only under appropriate legal mechanism under KVKK (e.g., explicit consent or approved safeguards). Aggregated indicators may be shared consortium wide. Identity-layer data not exported.
Access constraints	Role-based access control (RBAC); separation of identity layer; encryption in transit and at rest	Logical and physical separation of datasets; restricted access; audit logs	Strict access limitation; local control of identifiable datasets; documented transfer procedures
DPO / DPIA	DPO involvement where required. DPIA performed locally where applicable, using WP1/D1.4 template guidance	Local compliance under FADP. DPIA-equivalent assessment where required, aligned with project ethics framework	Local compliance under KVKK. DPIA-equivalent risk assessment performed locally, referencing WP1/D1.4 framework

Privacy-by-Design Architecture

SmartUrbanity follows privacy-by-design and privacy-by-default principles, embedding data protection requirements into the collection workflow, storage separation, access control, and output publication strategy. The measures described below apply to personal and user-



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generated data collected through SmartUrbanity digital tools and in-person engagement activities.

Workshops and focus groups (where individual-level data are collected) follow the same privacy-by-design principles, including separation of identifiers, secure storage with role-based access controls, and purpose limitation/retention logic for any contact details collected for follow-up.

Layered Data Architecture

SmartUrbanity adopts a layered architecture that separates datasets by purpose, re-identification risk, and access needs:

1. **Identity & Consent Layer.** This layer supports account management and lawful processing documentation. It stores only a minimal set of direct identifiers (e.g., emails where used) and consent records (e.g., timestamps, withdrawals). Data are encrypted at rest and accessible only to designated system administrators for account support and user-rights requests (e.g., withdrawal, deletion). This layer is not used for modelling or analytics.
2. **Operational Issue-Reporting Layer.** This layer contains actionable location-based reports intended to support operational follow-up and decision support (e.g., barrier reports, broken streetlights, missing sidewalks, unsafe crossings). It may include report metadata (time, location), structured categories, and optional user-provided descriptions. Access is controlled and granted only to designated stakeholders (e.g., municipal or service partners where applicable) under defined governance procedures (triage, validation status, and resolution tracking). Where free text is enabled, content minimisation and moderation rules apply.
3. **Aggregated & Anonymised Public Outputs Layer.** This layer contains only aggregated and anonymised indicators used for dashboards and, where applicable, open-data releases (e.g., summary statistics, accessibility metrics by spatial unit, map layers derived from minimum-count thresholds). Before publication, disclosure-control safeguards are applied (spatial/temporal generalisation, suppression of sensitive locations, and checks against re-identification through rare patterns). No



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direct identifiers and no reasonably linkable indirect identifiers are retained in published outputs.

4. **Controlled-Access Scientific Datasets.** Curated datasets derived from the Pseudonymised Operational & Analytics layer may be generated for sharing with qualified partners under Data Use Agreements (DUAs). These datasets remain pseudonymized, are released only for clearly specified scientific purposes, and are handled in line with GDPR Article 89 and FAIR principles. They are never made openly downloadable and may be produced only when required in later project phases.

Logical Data Levels and Access Model

To ensure consistent handling across pilots, SmartUrbanity defines logical data levels aligned with re-identification risk and access restrictions:

- **Level A - Identity and consent data:** direct identifiers and consent logs used exclusively for authentication, consent tracking, and fulfilment of data subject rights.
- **Level B - Pseudonymized operational and analytics data:** mobility traces, surveys, and perception reports linked by pseudonymous IDs, accessible only to authorized project roles for modelling and evaluation.
- **Level C - Operational issue-reporting data:** actionable reports shared with authorized stakeholders (e.g., municipal/service partners where applicable) under controlled access and governance workflows.
- **Level D - Aggregated and anonymized public outputs:** indicators and map layers released publicly only after aggregation and disclosure control.
- **Level E - Controlled-access scientific datasets:** curated pseudonymized datasets shared under DUAs for specific scientific purposes.

This logical separation enables longitudinal analysis while reducing re-identification risk through minimisation, pseudonymisation, role-based access control, and controlled publication with disclosure-control rules.



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Longitudinal analysis is performed only on pseudonymised datasets (Layers 2/5; Levels B/E), while anonymisation applies only to aggregated/public outputs (Layer 4; Level D) after disclosure-control checks. The layered architecture and logical levels provide a consistent basis for retention rules, deletion workflows, and cross-pilot accountability mechanisms described in the following sections.

I. Data Storage and Separation Principles

Storage follows the layered separation described above to reduce re-identification risk while preserving longitudinal analytical capacity. The separation is enforced as follows:

- **Identity confinement:** direct identifiers and consent records are confined to the **Identity & Consent layer** and are not used for modelling, analytics, or dashboards.
- **Pseudonymized research/analytics storage:** mobility traces, surveys, and perception reports are stored in the **Pseudonymized Operational & Analytics layer** and linked only via internal pseudonymous identifiers (e.g., user_XXXX).
- **Controlled operational follow-up:** actionable issue reports are handled in the **Operational Issue-Reporting layer** under controlled access and governance workflows (triage, validation status, resolution tracking), with minimization rules applied to optional free-text where enabled.
- **Public exposure limits:** dashboards and public channels expose only **aggregated and anonymized outputs**, after spatial/temporal generalization and disclosure-control checks.
- **Controlled scientific sharing:** any partner-to-partner sharing of pseudonymized datasets occurs only under **Data Use Agreements (DUAs)**, purpose limitation, and role-based access controls.

Implementation measures. The separation is supported by the following measures: role-based access control so only authorized users can access each data layer; encryption of all sensitive datasets both at rest and in transit; access logging and audit trails for administrative and research activities; strict rules preventing personal identifiers from being joined into



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analytics datasets; and publication rules based on minimum-count thresholds to avoid re-identification in public outputs.

Incident handling. Security incidents and suspected personal data breaches are handled through partner-specific incident response procedures, including internal escalation, documentation, and, where applicable, notification to competent authorities and affected participants in line with legal requirements.

These principles provide the basis for the retention and deletion rules described in the following section.

Consent, Transparency, and Ethical Safeguards

SmartUrbanity processes personal data based on **explicit, informed consent**. Consent is obtained before any collection starts and is documented in consent logs.

Participants:

- provide active informed consent prior to data collection.
- can withdraw consent at any time, triggering project procedures to stop further collection and handle associated data according to applicable rules.
- can exercise data subject rights (e.g., access and deletion requests) via the project's designated channels.

Transparency is treated as a trust-building mechanism and is ensured through clear privacy notices and engagement communication. Participants are informed about:

- what data are collected and through which tools/channels.
- why data are collected (purposes and expected outputs).
- how data are protected (pseudonymization, aggregation, access restrictions).
- how results are published (dashboards and only aggregated/anonymized outputs).

Table 6 outlines the retention periods and legal basis applicable to each data category.

Table 6: Data Retention Logic by Category



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Data category	Typical retention logic	Legal basis logic	Notes
Identity & consent data	Retained only for duration necessary to manage participation and withdrawal rights; deleted or irreversibly anonymised after pilot closure	Art. 6(1)(a) consent	Stored separately from analytical datasets
Pseudonymised mobility & perception data	Retained for pilot duration; extended retention possible for scientific/statistical research under Art. 89 (or equivalent), subject to safeguards	Consent + research/statistical processing safeguards	No re-identification: key separation maintained
Aggregated / anonymous indicators	May be retained long-term for reporting, scientific dissemination, and replication	Not personal data (after effective anonymisation)	Disclosure control applied before publication

On project partners side, Task 2.3 aims at regulating and assuring that every project partner agrees on collecting, storing using and cancelling data according to the current laws and regulations. To this aim and given that each partner is responsible for its data, the following modules have been developed and sent to the partners:

1. Legal declaration to adhere to the laws and regulations of the GDPR (FADP or KVKK, where applicable): a short statement in which each partner formally commits to comply with data protection requirements throughout the project.
2. Declaration of data type collected and used within the SmartUrbanity project: a standard form each partner completes to specify what personal data it collects, why, and how it is protected.

The result is that every partner is now clearly aware about the GDPR principles, and aware and responsible for its data in a transparent and ethical way.



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Smart Urbanity – Data Protection & GDPR Guidelines for Partners

Purpose

This document provides guidance to all SmartUrbanity partners on how to ensure data protection compliance, in line with the General Data Protection Regulation (GDPR) or other relevant Data Protection legislation. It supports the proper completion of the *GDPR Compliance Information Sheet*. Each partner is responsible for the processing of their own data and must comply with local legal frameworks. This document defines a common standard for managing personal data in the project.

1. Data Handling Protocols

All partners must define and follow consistent procedures for handling data across its lifecycle:

- **Data Collection:** Clearly define the purpose and legal basis before collecting any personal data. Collect only what is necessary (data minimization) to avoid redundancy and future unintended uses. Use informed consent where applicable.
- **Sensitive Data Management:** Properly manage sensitive data categories (e.g., disability status, income, health information, precise location data) with clear, specific, and revocable consent obtained for each data category separately.
- **Minors Protection:** Include specific rules and safeguards for minors participating in the app and gamification components. Obtain parental or guardian consent where required by law. Ensure age-appropriate design and content.
- **Image Uploads:** Establish procedures for handling user-uploaded images that may contain identifiable information (e.g., faces, license plates). Implement automated or manual review processes to detect and handle such content. Obtain explicit consent or apply appropriate anonymization techniques (e.g., blurring) before further processing or sharing.
- **Data Storage:** Store data on secure infrastructure. Keep raw data separate from identifying information when possible. Maintain access control.
- **Data Sharing:** Share only with authorized members. Use encrypted transfers. Anonymize or aggregate personal data for external use.
- **Data Processing Agreements:** Ensure Data Processing Agreements (DPAs) are signed between all partners where one partner processes data on behalf of another. Include Consortium Agreements (CA) where applicable to clarify responsibilities.

Figure 3: First page of the Data Protection & GDPR Guidelines for Partners, the legal declaration by which each partner commits to comply with the GDPR (or FADP/KVKK) during the SmartUrbanity project. Each partner must return it signed.





SmartUrbanity – GDPR Compliance Information Sheet
Data Processing Declaration

PARTNER INFORMATION

Partner Name: _____

Country: _____ Contact Person: _____

Email: _____

1. Do You Collect Personal Data?

Important: If your organization does not collect, store, or process any personal data for SmartUrbanity, please check the box below and skip to the signature section.

☐ **Our organization does NOT collect any personal data**

If you checked this box, you only need to sign at the end. If you will collect data, continue with sections 2–9.

2. What Data Do You Collect and Why?

2.1 Purpose of data collection (What are you doing with the data?)

Example: We collect trip information (start/end time, location, mode of transport) to analyze urban accessibility and inform sustainable mobility policies.

2.2 Types of data collected (Check all that apply)

☐ Basic information (name, email, phone)

☐ Location data (GPS coordinates, addresses)

☐ Travel information (routes, times, transport mode)

☐ Sensitive data (disability status, income level, ethnic origin)

☐ Technical data (device type, IP address)

☐ Other: _____

SmartUrbanity – GDPR Compliance Form
1

Figure 4: First page of the GDPR Compliance Information Sheet, the standard form through which each partner declares the types of personal data it collects and how they are processed within SmartUrbanity. Each partner must return it completed with all information and signed.

Ethical safeguards and non-coercive engagement

SmartUrbanity may use gamification elements — such as points, badges, or progress indicators — to encourage participants to stay engaged with the project tools over time. These features are optional and will only be introduced after ethics and privacy review.

Gamification features are available only to registered users. The records required to operate those features, such as points earned, badges unlocked and participation history, are therefore associated with the registered account through the system's internal user identifier. These records are not anonymous and remain linkable to the account under controlled access. Direct identity and contact data should remain separated from gamification-event data where supported by the system architecture. The applicable purpose, account linkage, access permissions, retention and deletion rules must be stated in the user-facing privacy notice and applied consistently with the controls governing other account-related project data.

Gamification data is only used to understand and improve engagement levels across pilots. It is never used for advertising or commercial purposes.

All gamification features are designed to be fair, optional, and transparent. Participants who choose not to use them are not affected in any way.

Separation of identifiers, storage, and retention logic (privacy-by-design)

To reduce re-identification risk while enabling longitudinal analysis, SmartUrbanity separates:

- **Identity & consent data:** minimal identifiers and consent logs used for account management and fulfilment of user rights (e.g., withdrawal/deletion);
- **Pseudonymized operational & analytics data:** mobility traces, surveys, and reports stored under internal pseudonymous identifiers rather than direct identifiers.



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Direct identifiers are not used for modelling or dashboard publication, and access to pseudonymized datasets is restricted to authorized project roles for defined purposes.

Retention periods follow partner procedures and applicable law. Where contact details are collected solely for follow-up, they are deleted after the defined retention period, while pseudonymized data may be retained for research purposes under the project's governance framework.

Compliance toolkit and partner documentation

To support consistent implementation across pilots, SmartUrbanity provides a two-layer compliance toolkit:

- (i) partner-facing Guidelines and
- (ii) a standard Compliance Information Sheet to document pilot-specific arrangements.

Data Protection and Guidelines for Partners

The Data Protection and Guidelines for Partners provide operational guidance translating legal requirements into project procedures. They define minimum safeguards, required documentation, and partner responsibilities, including arrangements for international transfers in a multi-jurisdictional consortium.

This document provides guidance to all SmartUrbanity partners on data protection compliance. It establishes a common standard for managing personal data across the project. It is intended as a framework document it sets the rules and minimum requirements that all partners must follow, while partner-specific implementation details are documented separately in each partner's Compliance Information Sheet. The guidance covers three main areas:

- **Data Handling Protocols:** Rules for how data should be collected, stored, shared, and deleted. For example: a partner collecting GPS traces through the Access Together app



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must store those traces under a pseudonymous identifier only, must not retain them beyond the defined project retention period, and must delete them upon participant withdrawal.

- **Compliance Strategies:** Requirements for documenting data processing activities and fulfilling legal obligations. For example: each partner who collects personal data must complete and sign the GDPR Compliance Information Sheet before any data collection begins and must identify a privacy contact within their organisation.
- **Security Measures:** Technical and organisational safeguards to protect personal data. For example: all datasets containing pseudonymous participant data must be encrypted at rest and in transit, and access must be restricted to named project roles only.

Compliance Information Sheet (pilot-level)

The Compliance Information Sheet is a standard template used by partners to document pilot-specific processing activities, security measures, retention/deletion rules, legal roles (controller/processor), DPIA status, and user-rights handling. Partners that do not collect personal data may sign the declaration-only section.

This form allows each partner to declare their data processing activities. It covers nine sections:

Table 7 lists the nine sections of the GDPR Compliance Information Sheet and their purpose.

Table 7: GDPR Compliance Information Sheet – Sections Overview

Section	Purpose
1. Do You Collect Personal Data?	Identifies if partner collects data
2. What Data Do You Collect and Why?	Documents data types and purposes
3. How Do You Get Consent?	Describes consent mechanisms
4. Special Rules for Gamification	Addresses voluntary participation
5. Data Storage and Security	Documents storage location and security measures
6. Data Retention and Deletion	Defines how long data is kept
7. Data Sharing and Legal Roles	Clarifies controller/processor roles



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8. Data Protection Impact Assessment	Documents DPIA status
9. User Rights	Explains how users can access, correct, and delete data

Together, these documents create a two-layer compliance system: the Guidelines explain what partners must do, while the Information Sheet documents what each partner does. Both documents are provided as attachments to D2.3 and are mandatory references for pilot deployment readiness.

7. Key Outputs and Pilot Readiness

The main achievements of this deliverable are:

- **A unified data protection framework:** The Data Protection and GDPR Guidelines for Partners create a common standard that all sixteen partners can follow, regardless of their country or organization type. This ensures consistent data handling practices across the five pilot cities.
- **A practical compliance tool:** The GDPR Compliance Information Sheet gives partners a simple way to document their data processing activities and demonstrate accountability. The form covers all key aspects of GDPR compliance in an accessible format.
- **Clarity on legal requirements:** The framework addresses the complexity of working across multiple legal jurisdictions by providing specific guidance for EU GDPR, Swiss FADP, and Turkish KVKK requirements, including rules for international data transfers.
- **Foundation for project activities:** The data management system enables the subsequent development of the Access Together Access Lab by establishing clear rules for data collection, storage, processing, and sharing.

Based on the work completed in this deliverable, the following recommendations are made:

- **Complete partner declarations:** All consortium partners should complete and sign the GDPR Compliance Information Sheet before beginning any data collection activities.



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- **Conduct Data Protection Impact Assessments:** Partners collecting sensitive data or processing data at large scale should complete DPIAs before pilot activities begin.
- **Appoint Data Protection contacts:** Each partner should identify a privacy contact or Data Protection Officer and communicate this to the consortium.
- **Review framework periodically:** The data management framework should be reviewed and updated as the project progresses, and new requirements emerge.

I. Key Outputs of Deliverable D2.3

Deliverable D2.3 establishes the conceptual, technical, and governance foundations of the SmartUrbanity Model and Data Management System. The seven main outputs of this deliverable are listed below, each with a brief description of what it contains.

1. Conceptual-to-operational modelling framework (Chapter 4)

A formalized perception-based accessibility modelling architecture, including:

- Perceived effort–weighted routing logic.
- Integration of environmental and contextual exposure into network links.
- Definition of user profiles and scenario-dependent multipliers.
- Calibration-ready structure for parameter estimation and validation.

2. Data domains and privacy-by-design separation (Chapters 4.6 and 6)

A layered architecture separating:

- Identity and consent data.
- Pseudonymized operational and analytics data.
- Operational issue-reporting data.
- Aggregated and anonymized public outputs.
- Controlled-access scientific datasets.

This separation ensures longitudinal analytical capability while limiting re-identification risk and enforcing role-based access control.



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3. Data source typology and harmonisation principles (Chapter 5)

Definition of:

- External infrastructure and contextual datasets.
- User-contributed mobility and perception channels.
- Common coordinate reference system rules.
- Data format and interoperability standards.
- Cross-pilot harmonization principles.

4. Data preparation and modelling workflows (Chapter 5.3)

Structured ingestion and transformation pipelines (Stream A and Stream B) enabling:

- Network construction and attribute enrichment.
- Exposure computation.
- Calibration dataset generation.
- Model validation and indicator computation.

5. Legal and governance framework (Chapter 6)

A unified compliance strategy covering GDPR, FADP, and KVKK requirements, including:

- Consent-based processing.
- Cross-border transfer safeguards.
- Storage limitation and retention logic.
- Transparency and participant rights.
- Ethical safeguards for engagement and gamification.

Together, these elements define a coherent and auditable data management ecosystem supporting perception-based accessibility modelling across pilots.

6. Data Requirements and Sources Mapping (Excel inventory)

A structured dataset inventory mapping:



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- modelling requirements and use cases.
- required data categories (infrastructure, behavioral, perception).
- data sources (open data, administrative data, user-contributed data).
- personal data flags and handling domains.
- pilot-specific variations.

This inventory provides traceability between modelling needs (Chapter 4), data sources (Chapter 5), and governance controls (Chapter 6).

7. Data Protection & GDPR Guidelines for Partners

Operational guidance for consortium partners covering:

- controller/processor role identification.
- consent collection requirements.
- data minimization and purpose limitation.
- storage separation and access control principles.
- international transfer safeguards (where applicable).
- retention and deletion logic.

Partners are required to acknowledge and implement these guidelines within their pilot activities. Controller/processor responsibilities and DPO contact points (where applicable) are defined at partner level and reflected in these documents and in the project Records of Processing Activities.

Pilot Deployment Readiness

The SmartUrbanity Data Management System is designed to be deployed incrementally across pilot cities under a controlled and harmonized framework.

Before full-scale deployment in each pilot, the following conditions must be verified:

- **Governance and legal readiness**
 - Clear identification of data controllers and processors.



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- Approved consent flows and privacy notices in local language.
- Documented international transfer mechanisms where applicable.
- **Defined retention and deletion procedures.**
 - Technical readiness
 - Secure separation of identity and pseudonymized layers.
 - Role-based access configuration.
 - Logging and audit trails for access and processing.
 - CRS and harmonization rules correctly implemented.
 - Data ingestion and quality-control routines tested.
- **Operational readiness**
 - Defined workflows for operational issue-report handling.
 - Moderation and minimization procedures for free text inputs (where enabled).
 - Dashboard aggregation thresholds and disclosure-control rules validated.
 - Clear communication strategy towards participants and local stakeholders.

This structured readiness approach ensures comparability across pilots while allowing contextual adaptation where required.

Implications

The data management framework established in this deliverable has several important implications for the SmartUrbanity project:

- **For Pilot Implementation:** The framework provides clear rules that must be in place before data collection begins in Rome, Karlsruhe, İzmir, Lyon, and Greater Zurich Area. Each pilot site can now prepare their local data collection activities with confidence that they are following a common standard.



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- **For Digital Solutions Development:** Access Together Access Lab can be designed with privacy requirements built in from the start. Developers know what data types require special handling, how consent must be obtained, and what security measures are needed.
- **For Partner Collaboration:** Data sharing between partners is now governed by clear rules. Partners understand when Data Processing Agreements are required and what safeguards must be in place for cross-border transfers.
- **For User Trust:** By establishing strong data protection practices early, the project builds a foundation for user trust. Citizens who participate in the pilots can be confident that their data is handled responsibly.



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8. Attachments – Controlled Annex Register

The table below is the controlled register of annexes to D2.3. Confidential items (signed documents bearing personal names, signatures, or dates) are marked and are distributed separately from the public version of this deliverable, in a restricted-access annex folder; they are not to be included in any publicly released version of D2.3.

#	Document	Type	Version / Date	Confidentiality	Location
1	Data Protection & GDPR Guidelines + signed Declaration – Sapienza (Guido Gentile)	Signed	13/03/2026	Confidential (signature, name)	Annex A (restricted)
2	Data Protection & GDPR Guidelines + signed Declaration – EGE (Taylan Günay)	Signed	28/12/2025	Confidential	Annex A (restricted)
3	Data Protection & GDPR Guidelines + signed Declaration – KIT (Martin Kagerbauer)	Signed	27/11/2025	Confidential	Annex A (restricted)
4	Data Protection & GDPR Guidelines + signed Declaration – SZTAKI (Domokos Esztergar-Kiss)	Signed	26/11/2025	Confidential	Annex A (restricted)
5	Data Protection & GDPR Guidelines	Signed	09/02/2026	Confidential	Annex A (restricted)

	+ signed Declaration — ZHAW (Valerio De Martinis)				
6	Data Protection & GDPR Guidelines + signed Declaration — ENTPE	Signed	Not dated — to verify	Confidential	Annex A (restricted)
7	GDPR Compliance Information Sheet (blank template, 9 sections)	Public internal /	v1.0	Not confidential	Annex B

9. References

- European Parliament and Council of the European Union. (2016). Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons regarding the processing of personal data and on the free movement of such data (General Data Protection Regulation). Official Journal of the European Union, L 119, 1-88.
- Federal Assembly of the Swiss Confederation. (2020). Federal Act on Data Protection (FADP). Fedlex, SR 235.1.
- Republic of Türkiye. (2016). Law on Protection of Personal Data (KVKK), Law No. 6698. Official Gazette, No. 29677.
- European Commission. (2021). Standard Contractual Clauses for international transfers of personal data. Commission Implementing Decision (EU) 2021/914.
- European Data Protection Board. (2020). Guidelines 05/2020 on consent under Regulation 2016/679. EDPB.



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- SmartUrbanity Consortium. (2024). SmartUrbanity Full Proposal: Advancing 15-Minute Cities through Collaborative and Smart Urban Solutions. DUT Call 2023.
- SmartUrbanity Consortium. (2025). Data Protection and GDPR Guidelines for Partners. Internal Project Document.
- SmartUrbanity Consortium. (2025). GDPR Compliance Information Sheet. Internal Project Document.



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