



Steering Towards Green and
Perceptive Mobility of the Future



STREETLIFE Technical Architecture

STREETLIFE Reference Architecture

The STREETLIFE project focuses principally on reducing carbon emissions in cities by implementing mobility solutions with means of sophisticated Information and Communication Technologies (ICT).

Information on sustainable transport alternatives, encouragement of users to change their mobility behaviour as well as improvement and management of transport and passenger flows are the most important topics that can be influenced by ICT solutions in order to meet the STREETLIFE goals.

The **STREETLIFE Reference Architecture** is an aggregation of stakeholders, layers and components reflecting the above purposes and goals of the STREETLIFE project. In effect, the purposes and goals form the problem space and the Reference Architecture that has evolved within the duration of STREETLIFE represents the solution space that addresses the problem space. In a very broad sense, it represents a system where different kinds of mobility-related data goes in and visualizations of processed mobility information are the result. This output is adapted to the requirements of the respective stakeholders, i.e. the mobility managers and the end users.

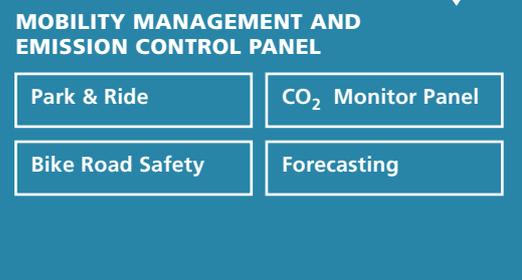
Different related solutions are logically categorized to form meta-solutions (or meta-components) which are placed in appropriate layers. The Reference Architecture connects stakeholders to the system's meta-solutions at the appropriate layers. The system's data passes through these layers and is transformed into visual information to be consumed by the appropriate stakeholders. The developer community is a specific stakeholder group that can exploit and consume the system's data downstream for their own business models.

The Reference Architecture can be considered as a **Blueprint for a Software Based System** that supports the purposes and goals of any project such as STREETLIFE. Although not depicted in the diagram, the interactions between stakeholders can be formulated with generic blueprint workflows that can be mapped onto the generic components of the Reference Architecture.

This blueprint is instantiated when a software platform based on the Reference Architecture is at first implemented and then further refined by the developer community. This platform instance in a city allows for an interaction between citizens and mobility managers of that city. The blueprint can also support extensions to such a platform, e.g. to support multiple cities.



USER INTERFACE



SERVICES

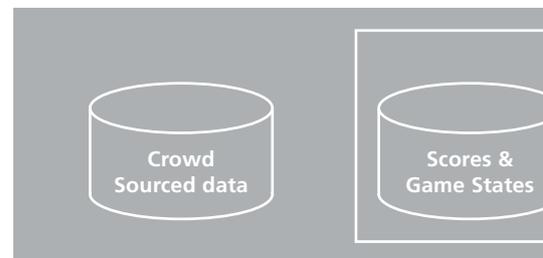
TOOL INTEGRATIONS

BUSINESS INTELLIGENCE

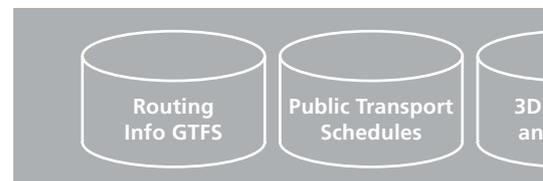
DATA ANALYTICS



DATA STORAGE



EXTERNAL DATA SOURCES



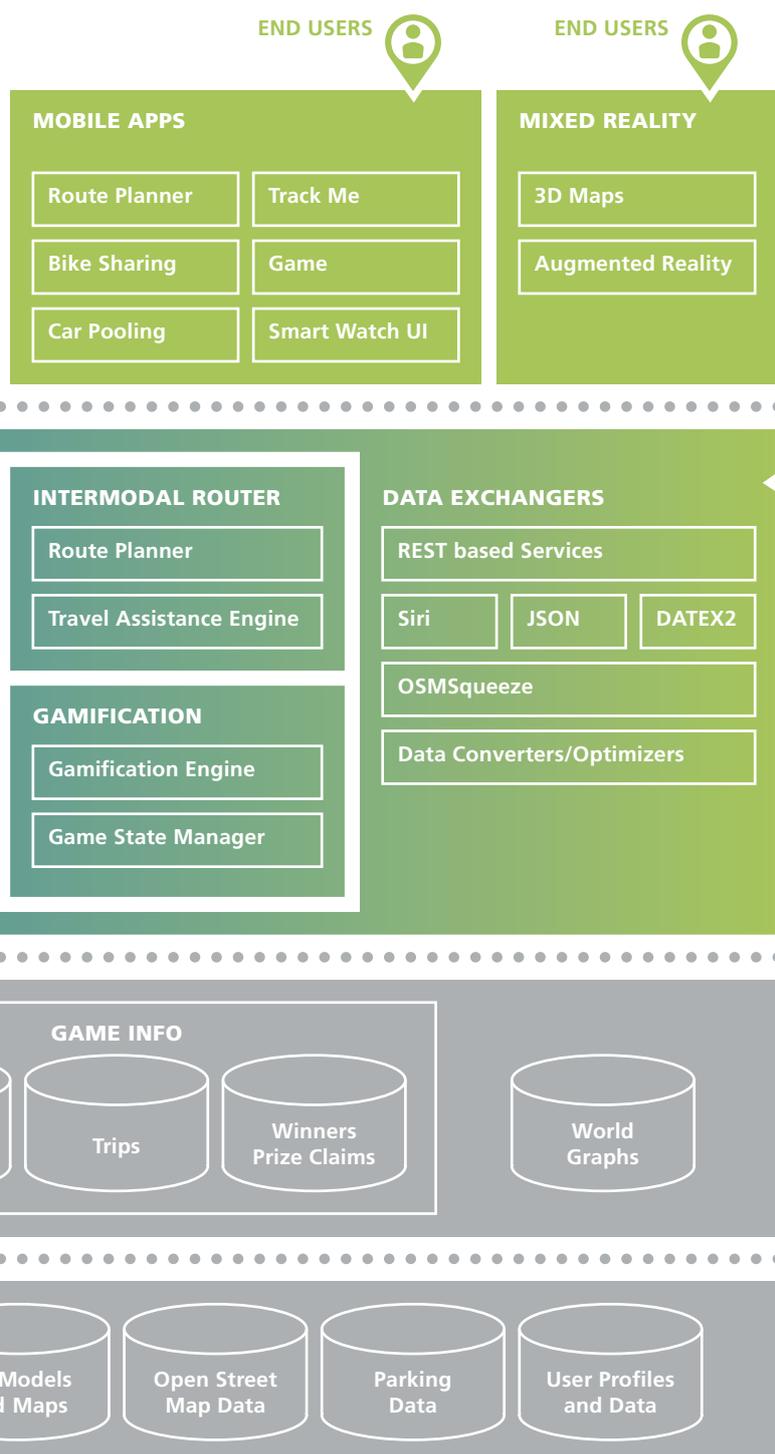
User Interface Layer

The User Interface Layer contains the (meta-) components that link two of the three stakeholder groups to the Reference Architecture, i.e. the mobility managers and the end users.

The meta-component **Mobility Management and Emission Control Panel** assembles the components which are useful for a mobility manager to monitor transport and environmental impact in a city:

- *Park&Ride* visualizes the occupancy of P&R facilities and aggregates the information in spatial categories.
- *Bike Road Safety* shows dangerous spots for bikers on a map.
- *CO₂ Monitor Panel* presents an estimation of the mobility-related CO₂ emissions in the city.
- *Forecasting* visualizes the predicted modal split for citizens visiting large events in the city.

End users can access some functions of the Reference Architecture by using dedicated **Mobile Apps** which consist of one or more of the following components:



- *Route Planner* provides a basic functionality for most apps. Origins and destinations can be entered and transport means selected. The resulting intermodal trips, calculated by the backend systems, are displayed.
- *Bike Sharing* shows the locations of bikes on a map and allows to find the nearest bike.
- *Car Pooling* connects different users to share cars so that more than one person travels in a car.
- *Track Me* provides a tracking functionality to be used when a travellers' position is required for further app functions.
- *Game* is the user interface of the gamification framework which can be integrated in several apps. It allows to participate in the games and to see the current status of the competition.
- *Smart Watch UI* allows to use a Smart Watch in combination with several apps.

Another interesting and exciting technological solution to reach the end user is the **Mixed Reality** meta-component. It consists of

- *3D maps* generating a three-dimensional landscape out of the cities' geographical data
- The *Augmented Reality* component mapping real and virtual world into a single visual environment.

Services, Tools Integration, Business Intelligence and Data Analytics Layers

The layers that perform the main work for the transformation of data into visual information are the Services, Tools Integration, Business Intelligence and Data Analytics Layers. They consist of the following meta-solutions:

- **MMECP** contains the data management and analytics for the Mobility Management Emission Control Panel as well as the simulation and forecasting engine.
- **Intermodal Router** offers the route planning functionality integrating several transport modes and the assistance during the trip.
- **Gamification** contains the gamification engine providing the game functions. The game state manager collects and processes the competition data of the games.
- **User Data Collection Services** are responsible for gathering crowd-sourced data and for the detection of the travellers' transport modes.

Several **Data Exchangers** are also part of the layer that controls the data flows between internal and external components. They link the third stakeholder of the Reference Architecture, the developer community, via APIs to the STREETLIFE systems.

Data Sources and Storage Layers

The External Data Sources Layer comprises the (real-time) data sources that deliver various information from the outside into the architecture. Different types of data sources are integrated:

- Geographical information such as 3D models and street maps
- Public transport data, e.g. bus schedules
- Private traffic data such as e.g. parking data
- User data and profiles

Information from external and internal sources is collected in databases of the Data Storage Layer, e.g.

- Crowd-sourced data from users
- Game information for conducting the games
- World graphs required for the Mixed Reality application



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Partners



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