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A9.9-D3: Demonstrator final release
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Short Description:
This deliverable consists of the implementation of the scenario demonstrator. In order to facilitate Humboldt user community, the Humboldt framework experience during the scenario development and implementation is produced in the form of a step-by-step guidance and uploaded on the Humboldt training platform. This document provides an executive summary of the Galileo Scenario demonstrator as a deliverable.
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Demonstrator, Galileo Scenario, Teaquila Application, Atmosphere

History:

Version	*Author(s)*	*Status*	*Comment*
001	Moses Gone	RFC	
002	Moses Gone	Final	Integrated Training component 1 as requested during Review meeting in Lisbon

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1 Introduction to HUMBOLDT Atmosphere Scenario

This deliverable consists of the implementation of the scenario demonstrator. In order to facilitate Humboldt user community, the Humboldt framework experience during the scenario development and implementation is produced in the form of a step-by-step guidance and uploaded on the Humboldt training platform. It is accessible from the URL: http://staging-esdi-humboldt.igd.fraunhofer.de:8080/AtmosphereScenario/

2 Scenario Demonstrator: Component 1

Air pollution can have harmful effects on human health and the environment as a whole. In recent years efforts to reduce air pollution levels have been increasing. However, high concentrations of ozone, particulate matter and nitrogen oxides continue to cause problems. Further improvement of air quality will be a main task for the future at national and international level. With the objective of reducing harmful air pollution in Europe, the European Union established common limit values for the most important air pollutants. In order to improve air quality, monitoring and assessing air quality on a regular basis is important.

For this purpose the Member States of the European Union have established common provisions. These provisions are based on Council Directive 96/62/EC on ambient air quality assessment and management. Consequently, all Member States are required to take the measures necessary to ensure compliance with the limit values.

The general public needs to be made aware of the general status and quality of the atmospheric around them. For instance, Ozone exposure has been linked to increased hospital admissions and emergency room visits for asthma and other respiratory problems. It can also reduce the body's resistance to infection. Long-term, repeated exposure to high levels of ozone may lead to large reductions in lung function, inflammation of the lung lining and more frequent and severe respiratory discomfort. Its therefore important to provide this information to the general public irrespective of their location.

2.1 What are Location Based Services (LBS)?

Location services enable customized information to be delivered or made available based on the specific location of the user. Knowing where the user is at any given time adds a valuable dimension to the kinds of services that can be offered. There are two distinct aspects of Location Services:

- Location Services (also called Mobile Positioning or Mobile Position Determination technology) deliver specific information about the geographic location (i.e., position) of mobile terminals such as mobile telephones, PDAs, etc.
- Location Application Services (also called Location-based Services) deliver end-user applications, normally based on knowing the position of a user with their mobile terminal. These services can be delivered through a wide range of devices, including wireless phones, in-vehicle tracking modules and other types of mobile terminals.

Atmosphere Scenario is based on integration and provision of atmospheric data through a Location-based Service (LBS). In this learning module, you will learn how such information can be collected, harmonized and integrated together for the intended users.

This component of the scenario training material is aimed at achieving the following learning objectives:

- To integrate atmospheric information to support initiatives for informing the public on ambient air quality and assisting experts in collecting or accessing this data.
- To enable users realize the added value to other LBS services and thus promote use of atmospheric data.
- Illustrate integration of sensor data using standards
- Show harmonization of atmospheric data

2.2 The context of the Scenario

This scenario is a demonstration of how data integration difficulties in location-based service provision domain can be tackled using the HUMBOLDT Framework. The scenario, demonstrates possibilities to provide users with harmonized air quality information especially adapted to their needs in a mobile environment. The main purpose is therefore, to offer comprehensive personalized air quality information depending on users' context (location and profile).

2.2.1 End users

The end users of the system are the general public and professionals at different level of expertise, equipped with mobile devices such as PDA, mobile phones, GPS receivers and/or sensors to measure atmospheric data components.

2.2.2 Data integrator

The data integrator is responsible for collecting data from data provider and harmonizes them before providing them to an end user. Efforts on data harmonization are therefore on the data integrator side. More specifically, the data integrator has the following roles:

- Extraction of required information from source data as provided by data vendors
- Data processing for which he may/may not employ HUMBOLDT tools.
- Air Quality information provision through processing and combining raw data sources to derive information needed by different categories of users
- Design data model for target datasets for use in the application.
- Managing user profiles for different users depending on users' data needs

2.2.3 Data provider/custodian

The most relevant data providers are public agencies and institutions collecting atmospheric and weather data. Usually this data is then passed on to European Environmental Agency after some quality assurance. The data providers are responsible for the sensor network that collects different atmospheric datasets. The datasets can be in various formats, some of which might need to be adapted to GIS standard formats. For instance, the UmweltBundesAmt (UBA) provides air quality data in a text format. The EEA provide processed data product that may need to be further processed according to the application needs.

2.3 Use cases and Scenario User Stories

2.3.1 User Story

Peter's daughter is Asthmatic. After visiting the doctor, they together worked to develop an asthma self-management plan for controlling her asthma on a daily basis and an emergency action plan for stopping asthma attacks. The plan assists Peter to know what he should do to keep his daughter's asthma under control. During diagnosis and testing, the doctor found out that Marie is especially susceptible to allergens such as pollen and irritants such as air pollution and cold air or changes in weather.

Consequently, in the Plan, the following among other measures is outlined: Avoid places and situations with cold air or where weather changes rapidly and abruptly, avoid places where the air pollutants concentration is above a certain level. It is therefore, important that the he is alerted as soon as possible about Marie's location and conditions at that location so that he can be reached and be provided with appropriate medication immediately by the emergency services. What Peter needs is a Service that can enable him to monitor and retrieve air quality information wherever Marie is. Additionally, the system should be able to automatically alert him and the doctor if she is in a place that makes him susceptible to asthma attack

2.3.2 Location - based atmospheric data provision for public use

This use case deals with the provision and utilization of atmospheric data-especially air quality data. These datasets may include: - ambient concentrations of hazardous air pollutants, pollen, ozone, and other atmospheric constituents. Using a mobile device, a user may need to retrieve the atmospheric data they are interested. This use case demonstrates how such user's requirements can be achieved. The use case illustrates how users at a given location can request for harmonized air quality information. For instance, scenario users might want to know the ozone levels, the concentration of particular pollutants/pollen in the air at a particular location. The application is targeted towards provision of data to the public and professionals interested in accessing air quality and/or meteorological information.

3 Analysis of required data and definition of the Scenario data model

There are two main sources of air quality datsets used within the scenario. The main source of data used in this scenario is the European Environmenatl Agency near realtime Air Quality data. This source includes, air quality datasets which contains; Ozone, particles, Sulphur dioxide, Carbon monoxide, Nitrogen Dioxide (and its oxides) components among others. Other LBS data, such as point of interests and base layers are also included. Air quality data service forms the main data component in the scenario.

Tabelle 1: Summary of main data sources used in Atmosphere scenario

Product	Description	Usage	Format	Source	Term of use	Refreshing	Retrieving
Air quality data (EEA)	A multi-component Air quality data (collected and managed by EU member countries)	Near real-time data on air quality	XML	EEA	Free	Hourly	Auto download and processing

Other Data	Base maps, data from other LBS services e.g. weather, POI servers, user-collected data			Various	Free	NA	Auto

3.1 The characteristics of the data used in the scenario

3.1.1 Data format

The Air Quality data are available as text files (XML). During extraction, these datasets are modeled into point features in a spatially enabled MYSQL database. Thus after extraction the data is available as vector (GML) data sets (e.g. AQ_Measures). Since data are sourced from the same data provider (), the issue of format heterogeneity does not arise. Thus, any mismatches between the raw sources data is handled during extraction to a common target schema.

3.1.2 Spatial reference systems

The spatial reference systems (SRS) used in both data sources (Air Quality) is WGS84 (EPSG 4326), however the interpolation service that interpolates the point data to coverages requires this dataset in UTM coordinates. Therefore coordinate transformation is required.

3.1.3 Conceptual data model

The conceptual data models for the Air quality datasets do not differ between the two countries focused in the Scenario. Currently, row measures for data quality are extracted and 'harmonized' before being stored in a common database schema. Thus even though the source data are different in terms of schemas, once extracted the differences are removed and only a common model exists.

3.1.4 Geometry types

The air quality measures are modelled as point geometry types. During interpolation, the point datasets are used to generate surfaces (coverages).

3.1.5 Identification and Versioning

The scenario is based on real time data provision, so the interest is only on the most current data. However, it might also be useful to provide trend maps, to show how the air quality improves or degenerates along a given timeline. Consequently, at the moment, it is not clear yet, if it's important to keep versions (history) of data.

3.1.6 Importance of time (temporal attributes)

There are timestamp attributes for the air quality measurements and weather measurements. However this information is only important for determining the most current data, as the scenario is based on real time data provision

3.1.7 Classification

There are a number of code lists and enumerations in the source as well as the target data model. For instance the ISO air quality component codes. However, since these are already standardized, both data sources are coded using the same codes hence problem of classification do not arise. However what is not clear yet is the classification of different categories of component concentration

3.1.8 Portrayal

Only individual values are returned to the users, so no portrayal is required.

3.1.9 Processing functions

Point data are interpolated to generate surfaces. This is achieved via a Interpolation surface generator WPS)

3.1.10 Multilinguality

All source data is available in English, however application since we have different categories of users with different language requirements, attribute values may need to be translated to another language according to according to the user language requirements.

3.2 The scenario data modeling work.

Based on the use case description the following sketch for the common data model for the Atmosphere scenario can be derived:

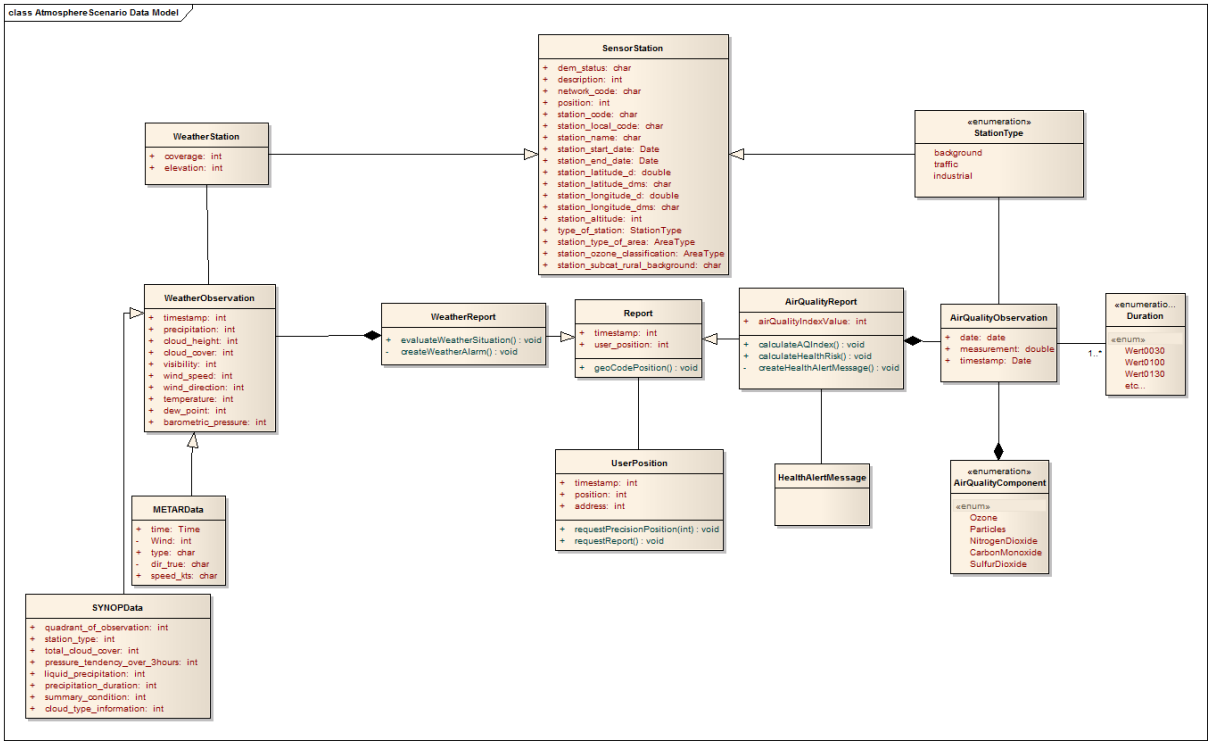

Figure 1: Common Atmosphere scenario data model

4 Training materials – Component 2

Additional resources such as live demonstrator can be accessed from the URL:

4.1 Training Components

- Component 1: http://www.inspire-

x.eu/humboldt/main/newscorm/lp_controller.php?action=view&lp_id=1&cidReq=LEVEL3THEATMOSP

- Component 2: http://www.inspire-x.eu/humboldt/main/newscorm/lp_controller.php?action=view&lp_id=2&cidReq=LEVEL3THEATMOSP

4.2 Online live Demo

http://staging-esdi-humboldt.igd.fraunhofer.de:8080/AtmosphereScenario/demo.html

http://staging-esdi-humboldt.igd.fraunhofer.de:8080/AtmosphereScenario/TeaquilaApp.jnlp

http://www.esdi-humboldt.eu/scenarios/atmosphere.html