POLITECNICO MILANO 1863

AirView Lombardia

Software Engineering for Geoinformatics

Requirement Analysis & Specification Document

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1 Introduction

Monitoring air pollution is crucial for safeguarding public health and ensuring environmental sustainability. This document outlines the requirements for a web-based system aimed at visualizing and analyzing air quality data across Lombardy, Italy. By integrating open datasets from Dati Lombardia with user-friendly visual interfaces, the system will enable various stakeholders to better understand pollution trends and exposure risks.

1.1 Context and Motivations

The effects of poor air quality are widespread, impacting health, climate, and overall quality of life. Governmental bodies and environmental researchers rely on accurate data to formulate policy and public health recommendations. However, current platforms lack accessible and intuitive tools for interpreting this data. This project aims to bridge that gap through a dedicated visualization and analytics platform.

1.2 Scope

The system will offer interactive maps, dashboards, and trend analytics, allowing users to explore pollution levels by region, time, and pollutant type. It will not function as a real-time monitoring tool but will focus on historical data exploration and analysis. Users will have access to different features based on their roles—government officials, NGOs, and students.

1.3 Solution Overview

The software will include:

- An interactive map of Lombardy with pollution heatmaps.
- Graphical dashboards displaying pollutant trends over time.
- User authentication with access-level-based permissions.
- Exportable data and report generation capabilities.

2 Application Domain and Description

2.1 Stakeholders

Table 1:Our program's stakeholders and concerns

Stakeholders	Concerns
Government Agencies	Require detailed insights into air quality patterns for environmental policy planning.
NGOs	Need access to data for advocacy and research.
Students	Seek a learning tool to understand real-world data applications in environmental science.

2.2 Actors

Table 2:The software's intended actors

Actors	Description
Environmental Officials	Analyze air pollution data and generate region-specific reports.
NGO Representatives	Access summarized insights for specific pollutants and regions.
Students	Interact with visual data to support learning and coursework.

2.3 Domain Assumptions

- Users have basic web navigation skills.
- Data from Dati Lombardia is reliable and periodically updated.
- Users have internet access and compatible devices.

2.4 Requirements

Functional Requirements (FR)

- **FR1**: Users can view an interactive map with regional air pollution levels.
- **FR2**: Users can filter pollution data by time, region, and pollutant.

- **FR3**: Users can log in and access features based on their user role.

Non-Functional Requirements (NR)

- **NR1**: Interface must be accessible, with clear labeling and intuitive layout.
- **NR2**: Data should be presented using standard, scientifically accepted units and visualizations.

Technical Requirements (TR)

- **TR1**: The system must interface with an API to retrieve pollution data from Dati Lombardia.

2.5 Use Case Diagram and Description

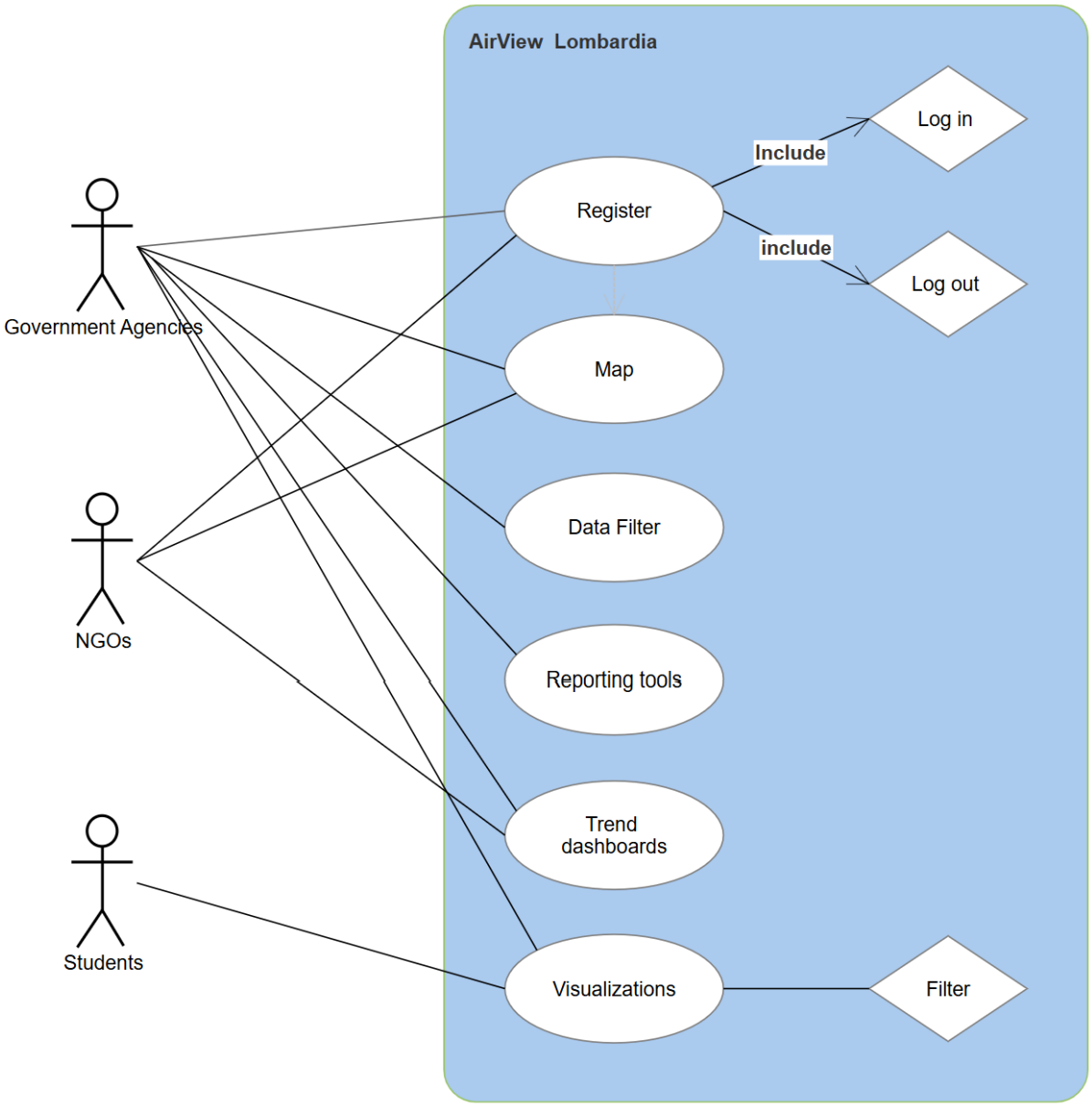

Figure 1: Use case diagram

The use case diagram distinguishes access levels:

- **Environmental Officials**: Full access to map, data filters, reporting tools.
- **NGOs**: Access to map and trend dashboards.
- **Students**: Access to visualizations.

2.6 Use Cases

Table 3:Environmental Official user case

Name	**Analyze Regional Pollution Trends**
Actor	Environmental Official
Flow of Events	Login → Select Region → Filter by Time & Pollutant → View Trend Analysis
Exceptions	Data not available for selected filter.

Table 4:NGO Representative user case

Name	**View Pollution Dashboard**
Actor	NGO Representative
Flow of Events	Login → Select Pollutant → View Dashboard Charts
Exceptions	Charts fail to render.

Table 5:Student user case

Name	**Explore Air Quality Map**
Actor	Student
Flow of Events	Access site → Explore Interactive Map by Region
Exceptions	Map tiles fail to load.

2.7 User Stories

- **User Story 1**: As an environmental official, I want to filter pollution data by region and pollutant type so I can assess long-term exposure risks.
- **User Story 2**: As an NGO representative, I want to view summarized data to support public awareness campaigns.
- **User Story 3**: As a student, I want to explore pollution data through maps and graphs for educational purposes.