

SIMILE Project: Integrated Lake Water Quality Monitoring

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Informative **S**ystem for the **I**ntegrated **M**onitoring of **I**nsubric **L**akes and their **E**cosystems

SIMILE

17 JANUARY 2019 – 16 JANUARY 2022

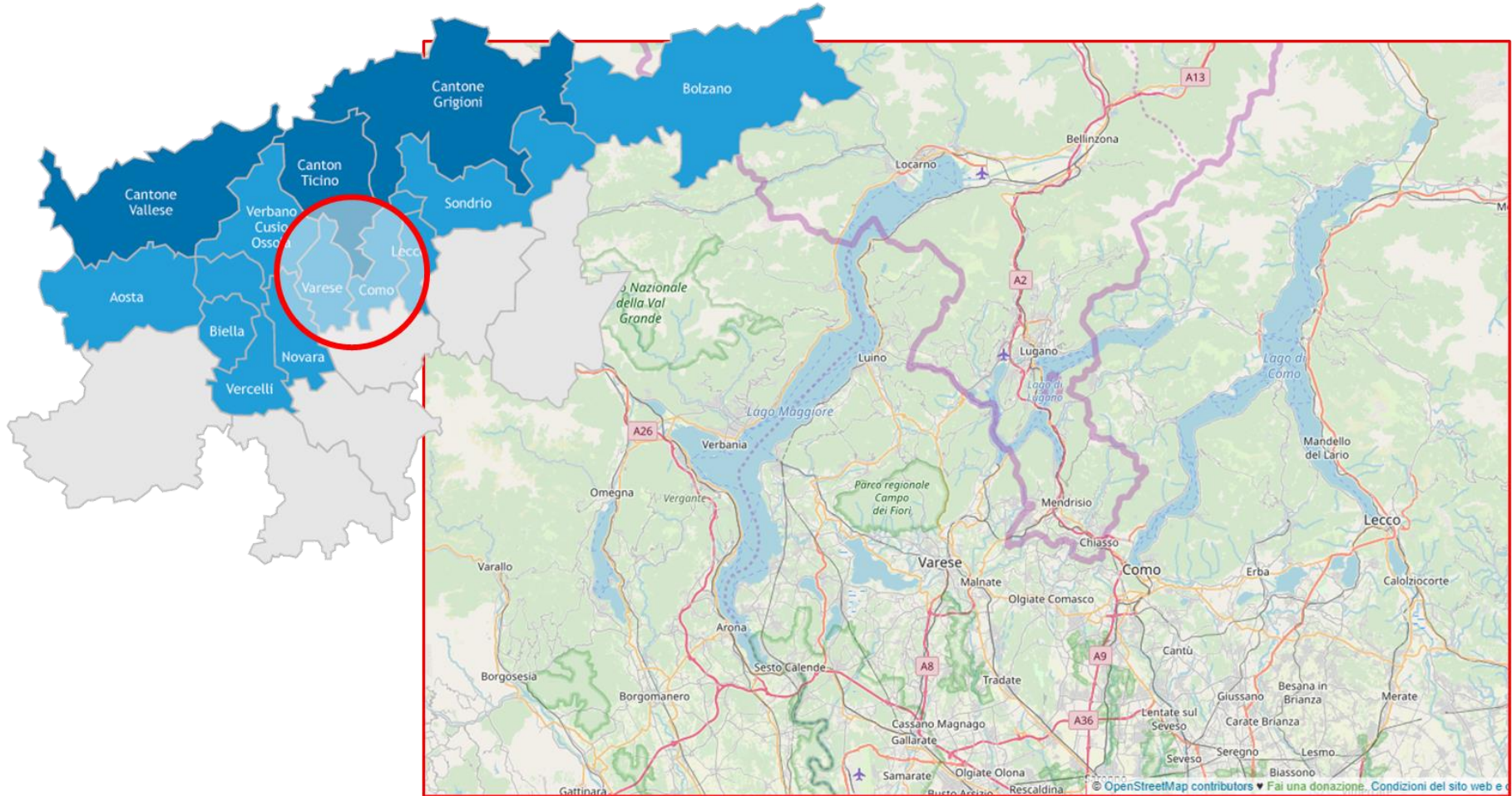
Axis 5 – Strengthening of cross-border governance



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PROJECT LOCATION



PARTNERSHIP

ITALY

Politecnico di Milano (Polo Territoriale di Lecco)

Lombardy Region - D.G. Environment and Climate (with the
collaboration of ARPA Lombardia)

CNR-IRSA Water Research Institute (Verbania-Pallanza)

Fondazione Politecnico di Milano

Collaboration: University of Pavia and CNR IREA MILANO

SWITZERLAND

Scuola Universitaria Professionale della Svizzera Italiana (SUPSI)

Canton Ticino – Environment Department

GOALS

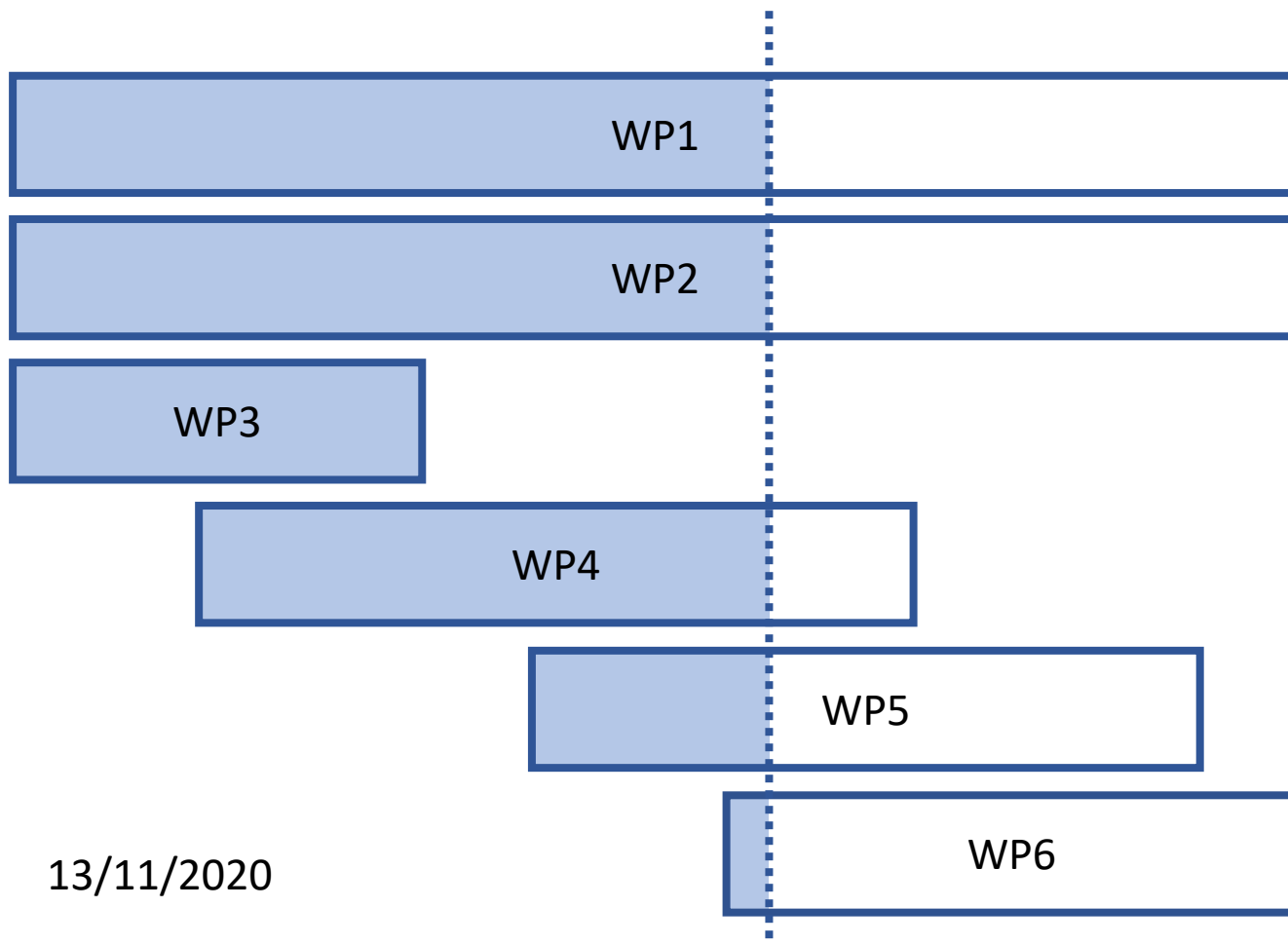
Protection of water quality for Insubric lakes (Maggiore, Lugano, Como)
Improvement of lake idric resource evaluation and management capacity

STRATEGIES

Coordination of existing monitoring systems with new data collection methods (HF Sensors, Satellite images, Citizen Science)
Increasing environmental awareness and promote legal and administrative cooperation between citizens and institutions
Cross-border operative agreement and policy-brief



PROGRESS



WP1 Coordination and management

WP2 Communication

WP3 Definition of an innovative approach for water quality management

WP4 Development of monitoring tools and methodologies

WP5 Development of a Business Intelligence platform

WP6 Guidelines definitions

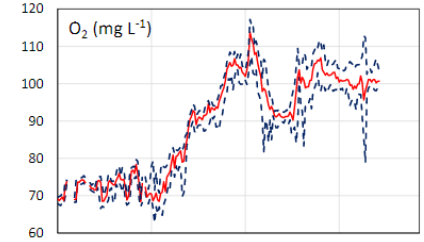
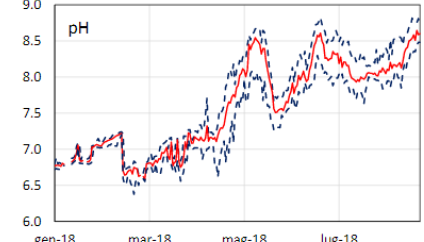
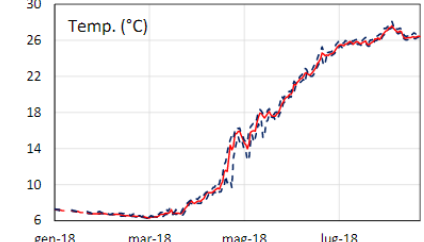
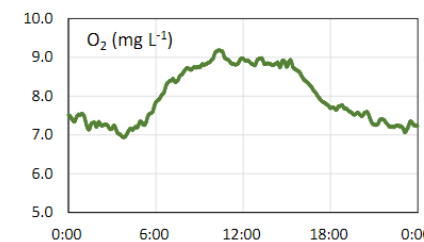
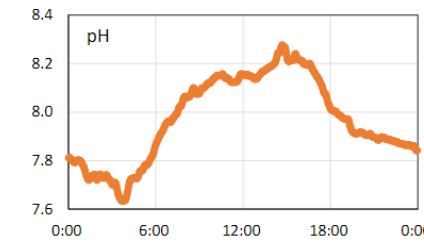
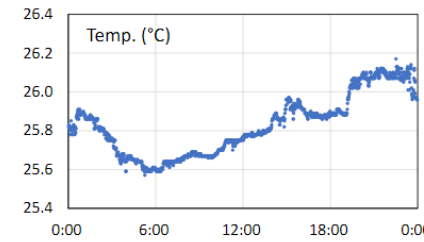
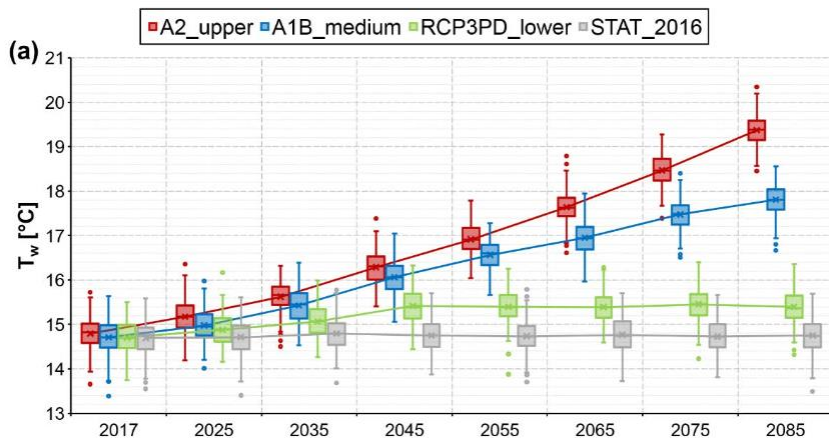
13/11/2020

WP3 INNOVATIVE APPROACH DEFINITION

State of the art of Insubric Lakes monitoring

Evaluation of needs and pressures (survey)

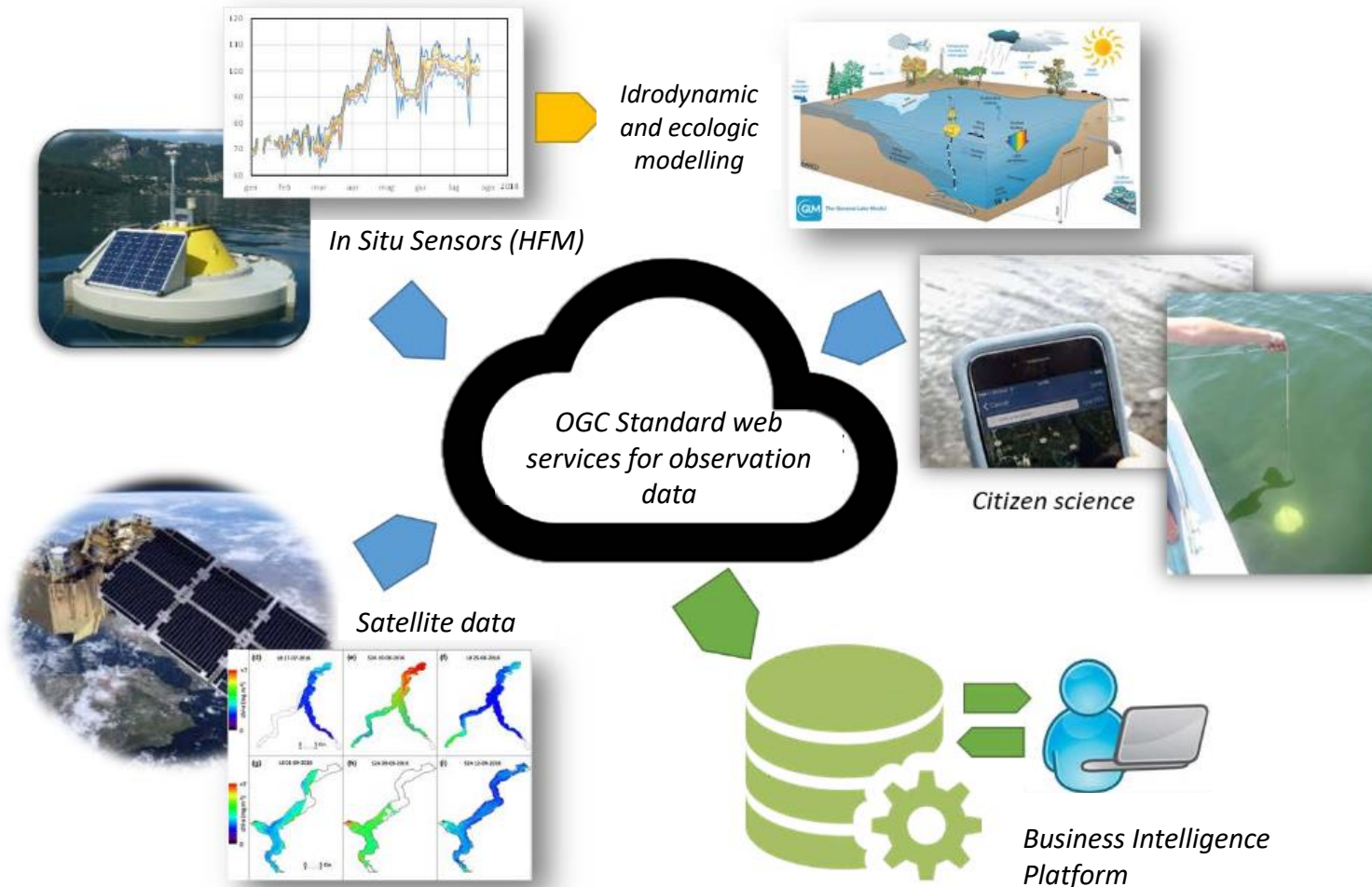
Design of the integrated monitoring system



Daily variations of water parameters

Temperature values for different climate scenarios

WP3 INNOVATIVE APPROACH DEFINITION





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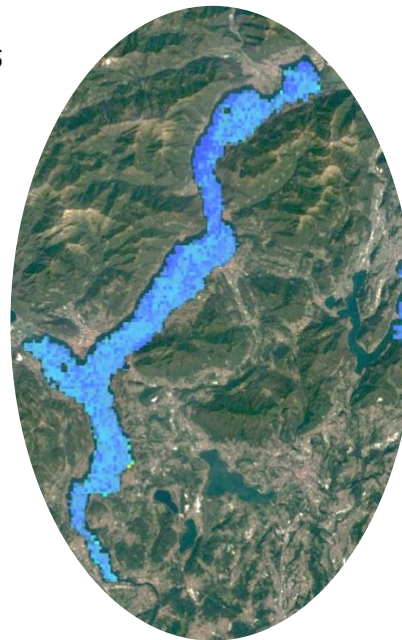
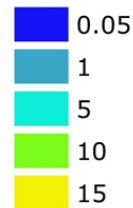
WP4 MONITORING METHODOLOGIES

In Situ
Sensors
(HFM)



Satellite
images

Chlorophyll
(mg/m³)



Citizen
Science

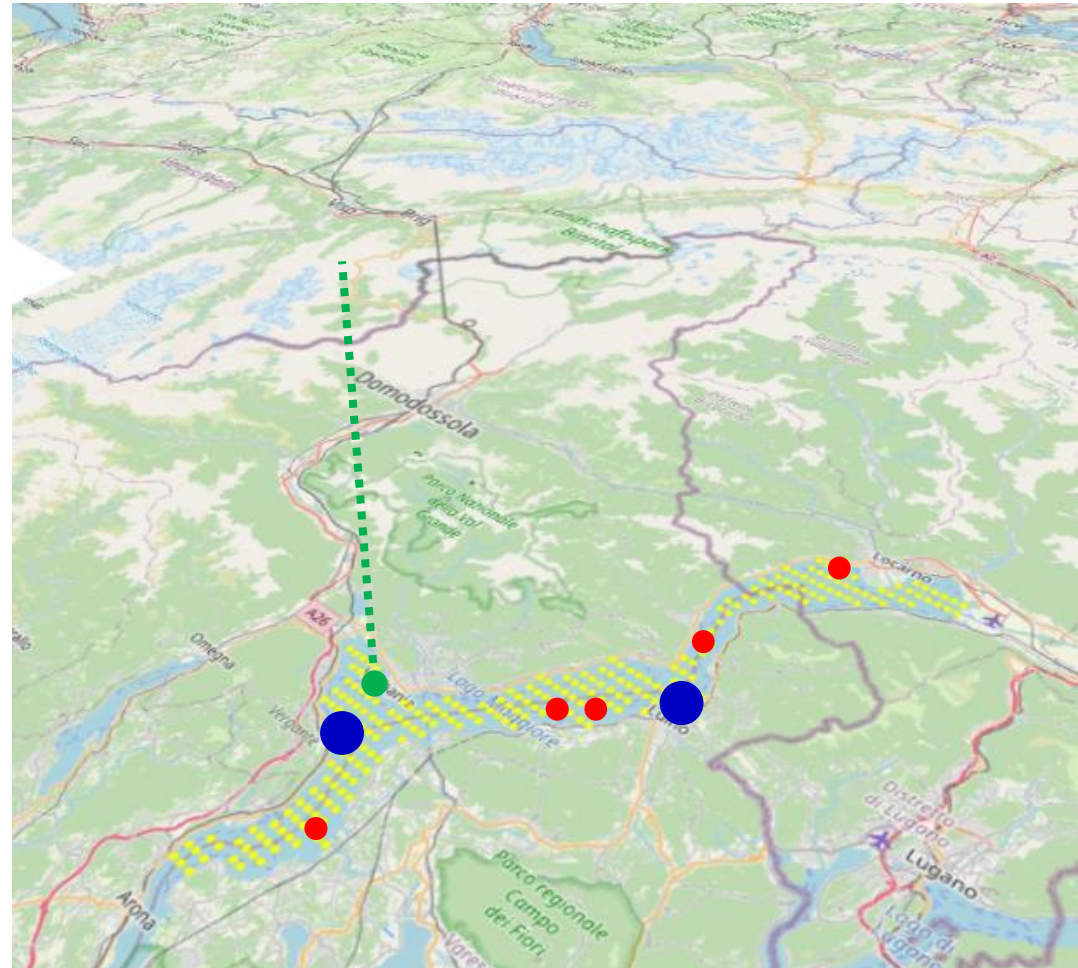
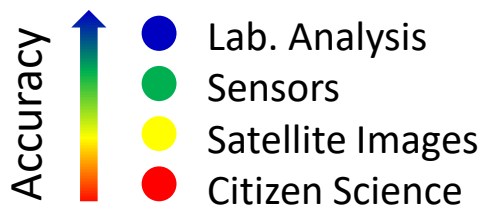
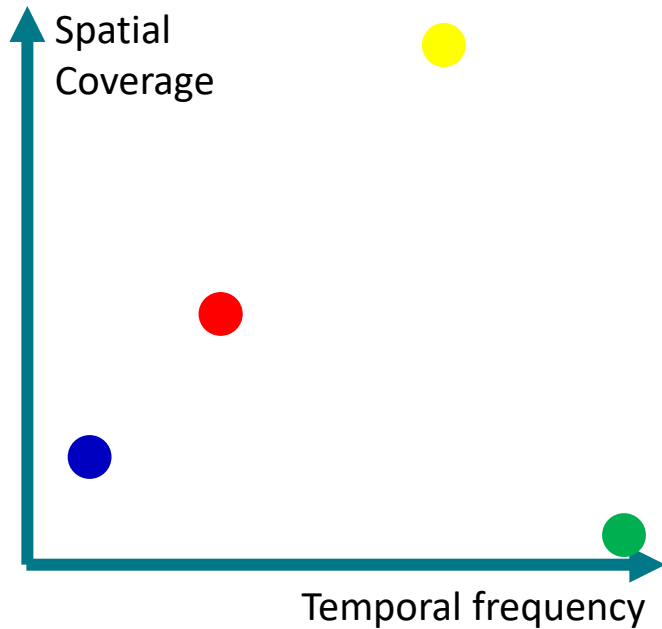


VOLUNTEER





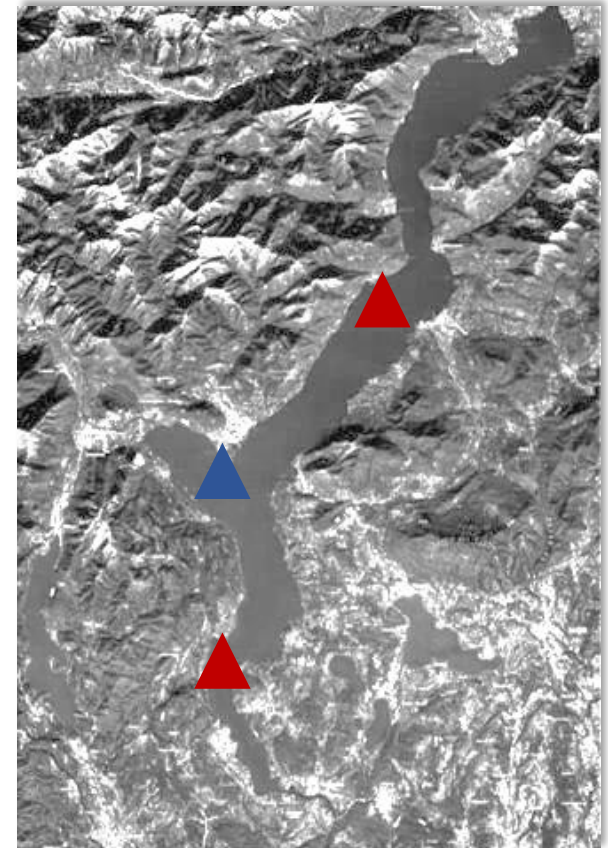
WP4 MONITORING METHODOLOGIES



Credit images: OpenStreetMap

WP4 PLATFORMS WITH SENSORS

- **Fixed buoy** for continuous and long-term monitoring. Data collection for discrete monitoring integration, modeling, sensor calibration and data control/validation
- **Movable buoys** for targeted campaigns (eg calibration and satellite data integration) and to increase spatial coverage
- Equipment: **basic sensors (Temp., PH, cond., O2)** + **fluorimetric sensors + thermistor chain** + **weather station**
- Powered by solar panels, data transmission via modem or wi-fi, programmable sampling rates



Example of platforms position for Maggiore Lake



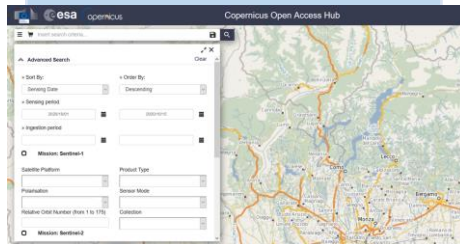
SIMILE

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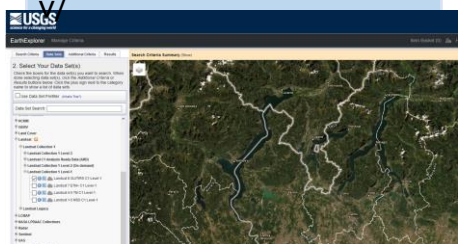
WP4 SATELLITE MONITORING

Image Download

OLCI Sentinel-3
<https://scihub.copernicus.eu/>

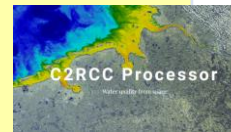


TIRS Landsat 8
<https://earthexplorer.usgs.gov>



Atmospheric correction

C2RCC
 (Brockmann et al. 2016)



→ SNAP | Sentinels Application Platform

Done loading modules



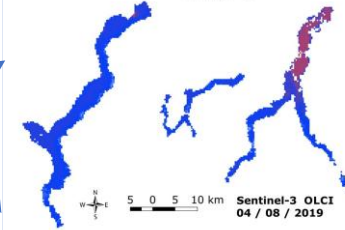
Barsi Method
 (Barsi et al. 2005)

<https://atmcorr.gsfc.nasa.gov/>



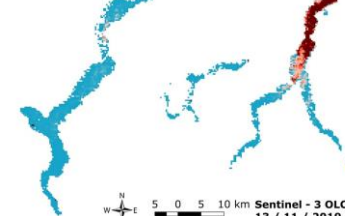
Water quality parameters maps

Chlorophyll - a



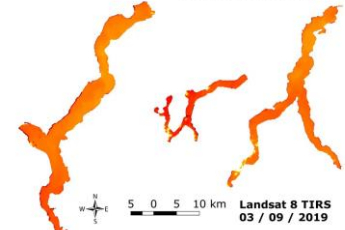
Chl-a

Solidi sospesi totali



TSS

Temperatura superficiale (°C)



T°

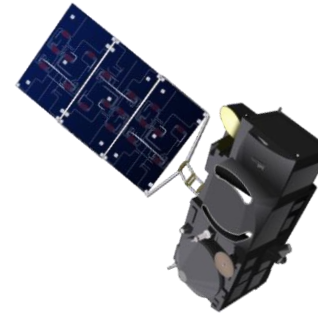


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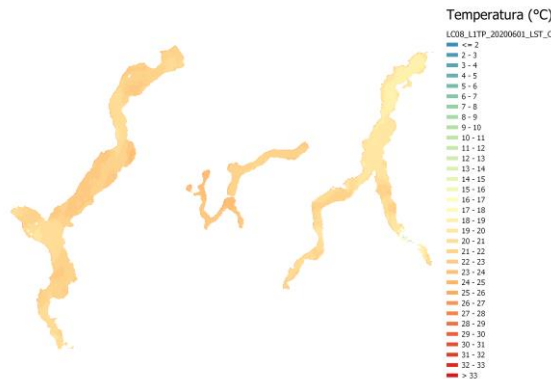
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WP4 SATELLITE MONITORING

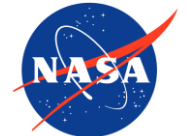
Sentinel-3



Optical sensor	OLCI (multi-spectral)
Bands	21 (443-1020 nm)
Spatial resolution	300 m
Temporal resolution	1-2 days
Active since	16 February 2016 - ...

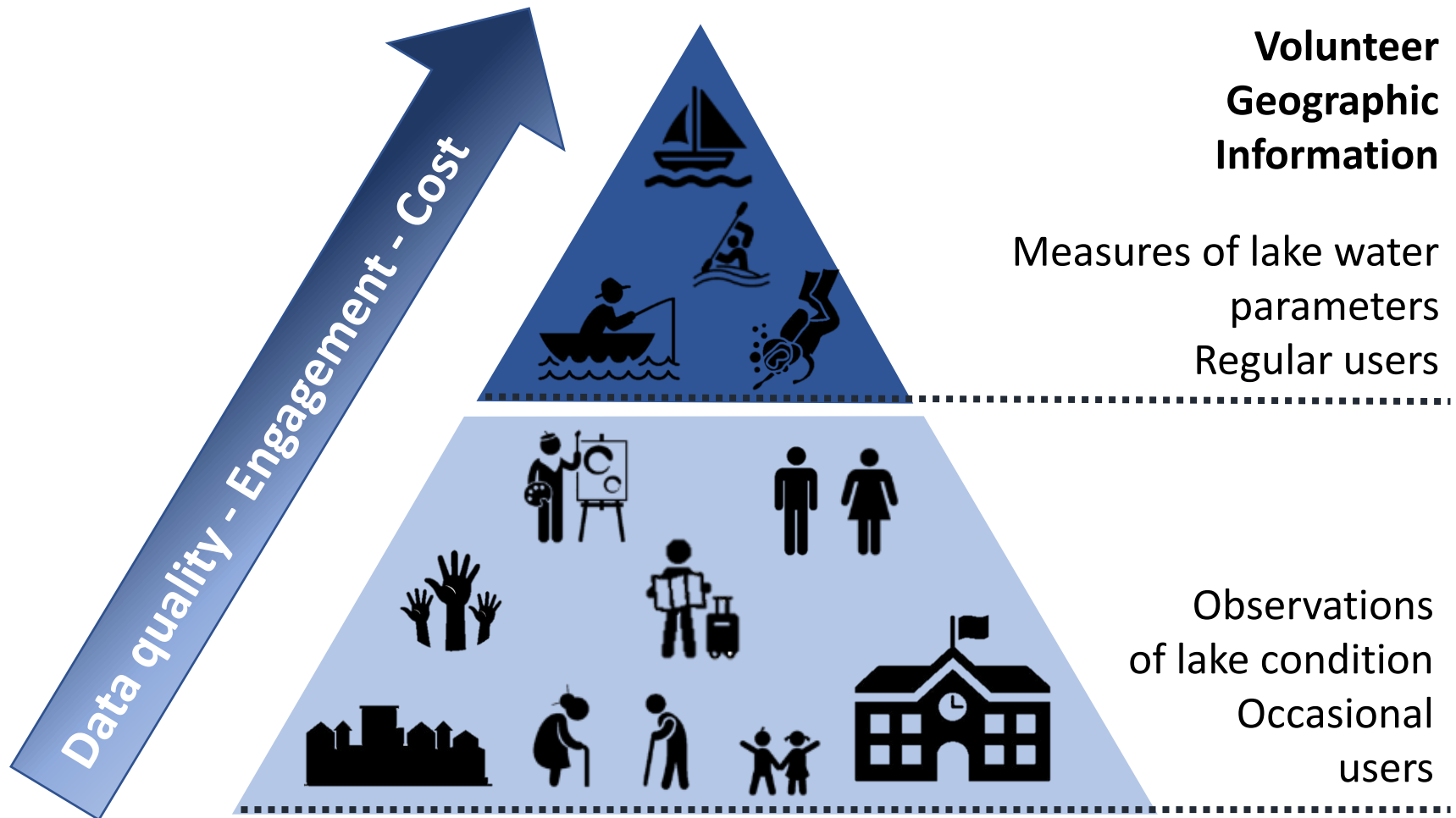


Landsat 8



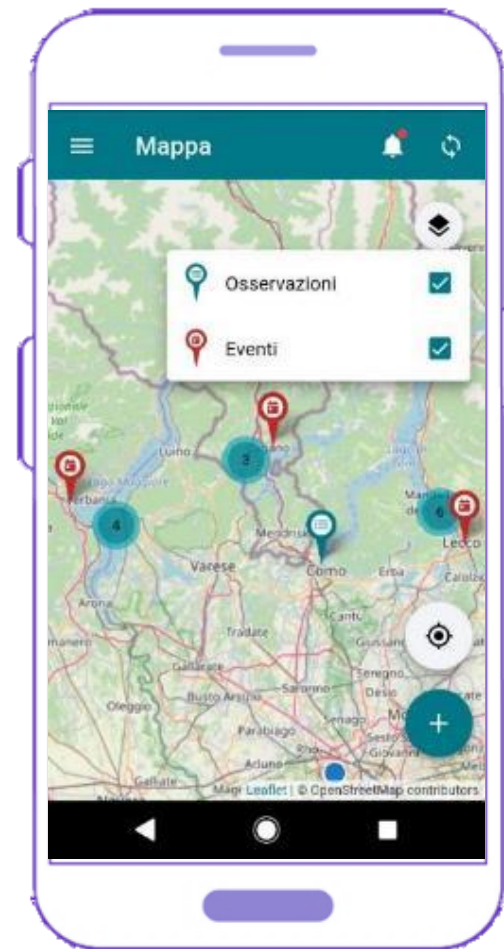
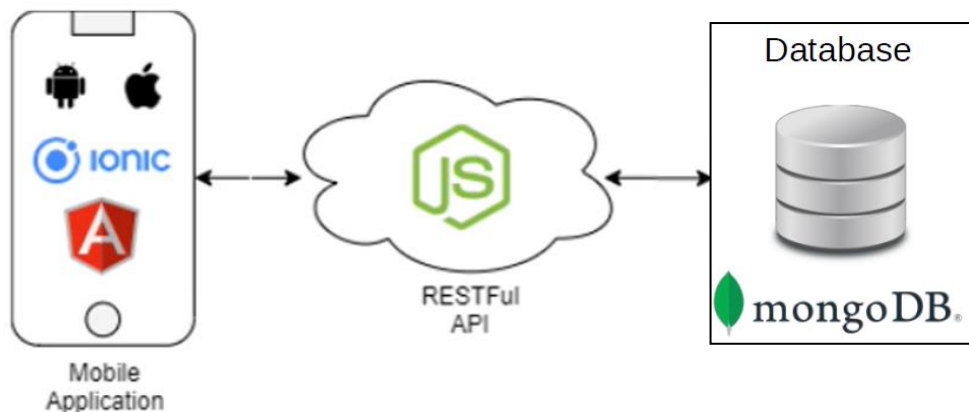
Sensors	OLI e TIRS
Bands	11
Spatial resolution	15 - 100 m
Temporal resolution	16 giorni
Active since	2013 - ...

WP4 CITIZEN SCIENCE



WP4 CS MOBILE APPLICATION

- **Observations:** algal blooms, foams, oil stains, litters, drains, odours and fauna (alien species)
- **Measures:** transparency, temperature, pH, Oxygen, Bacteria
- **Events:** seminars, trainings, clean-up, mapathons, activities with the schools
- **Glossary:** increase awareness about the lake environment and the organisms that inhabit it





63% 14:14





WP4 CS APP OBSERVATIONS



Algal blooms



Litters

Drains

Foams

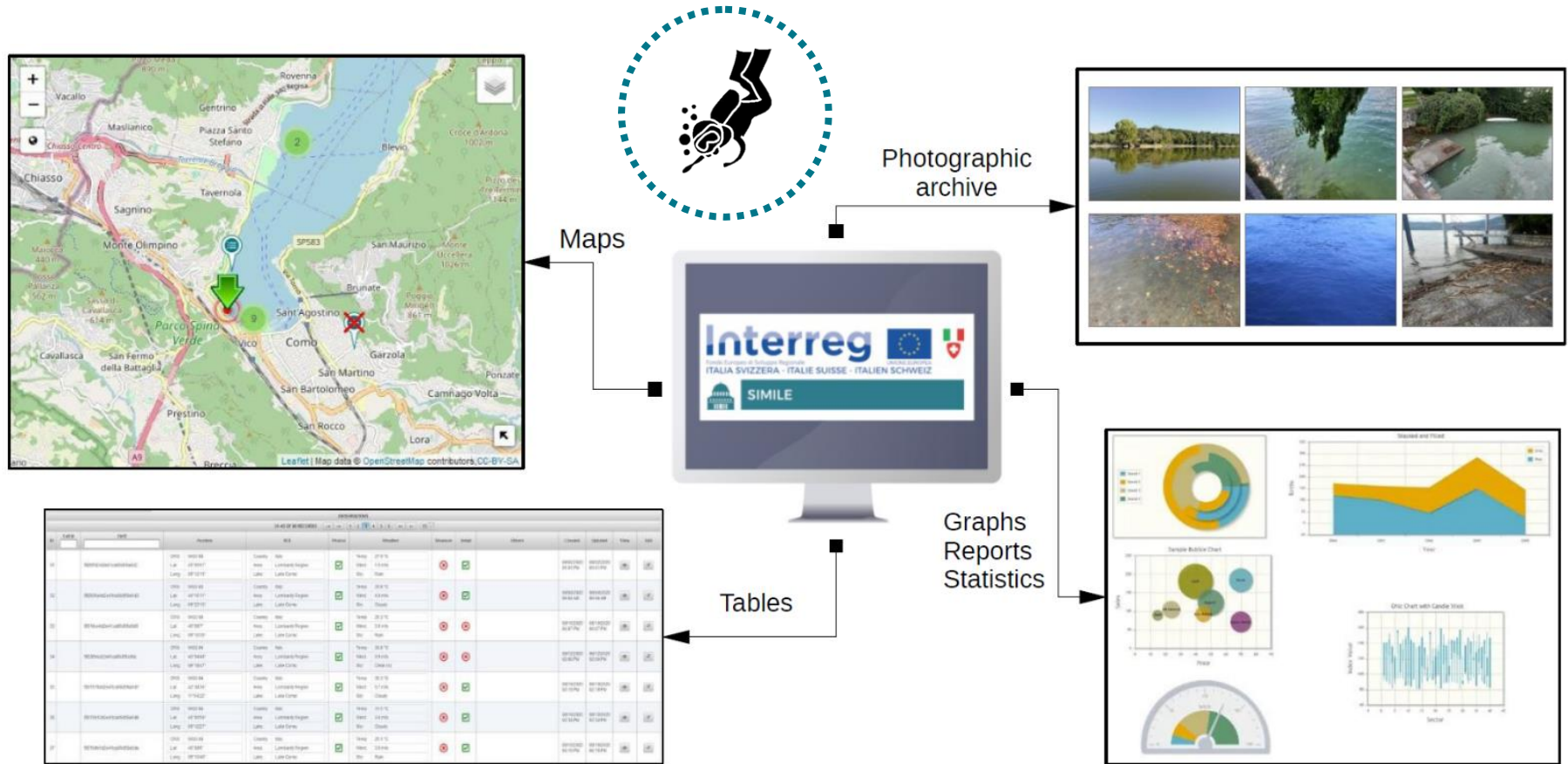




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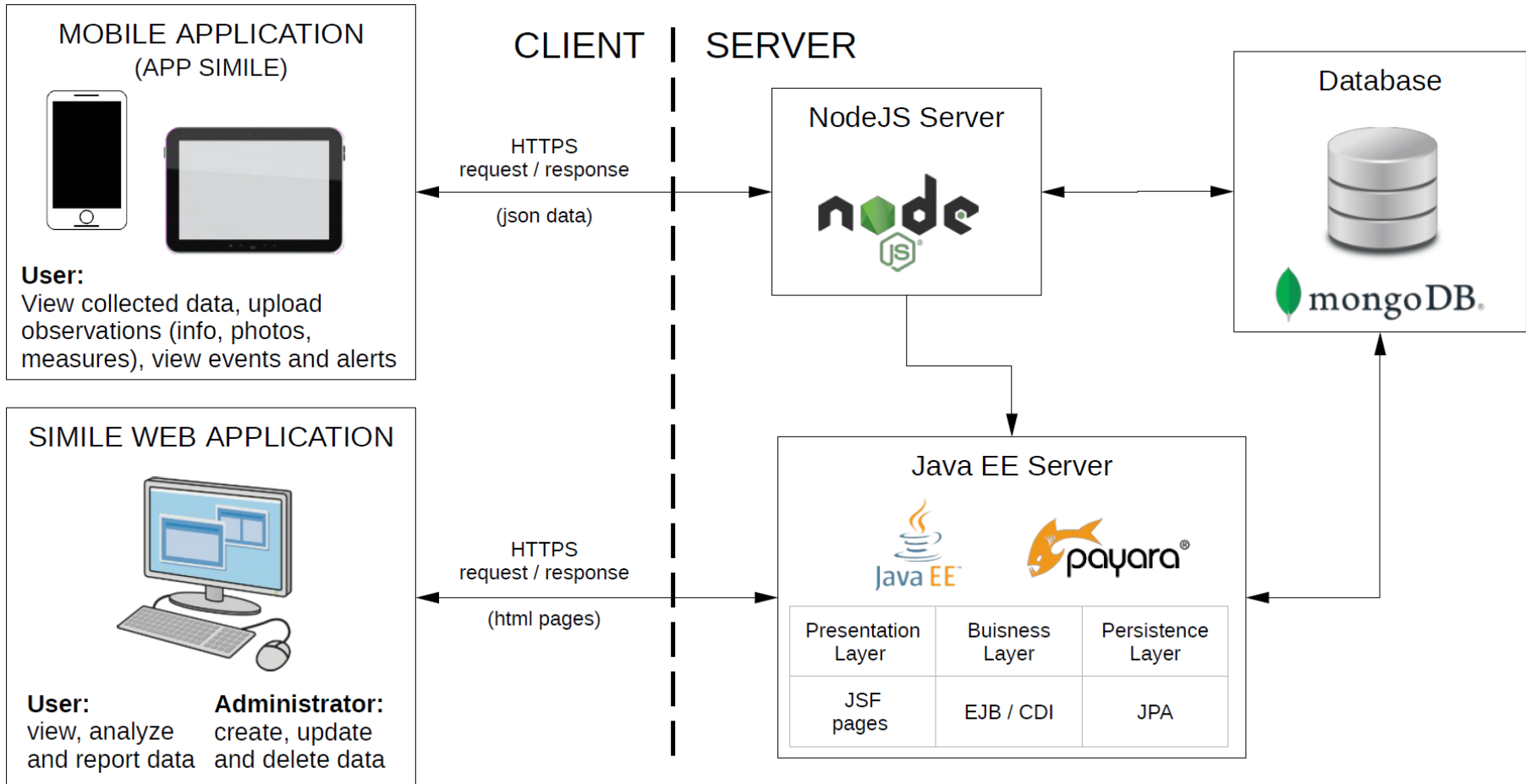
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WP4 CS WEB INTERFACE



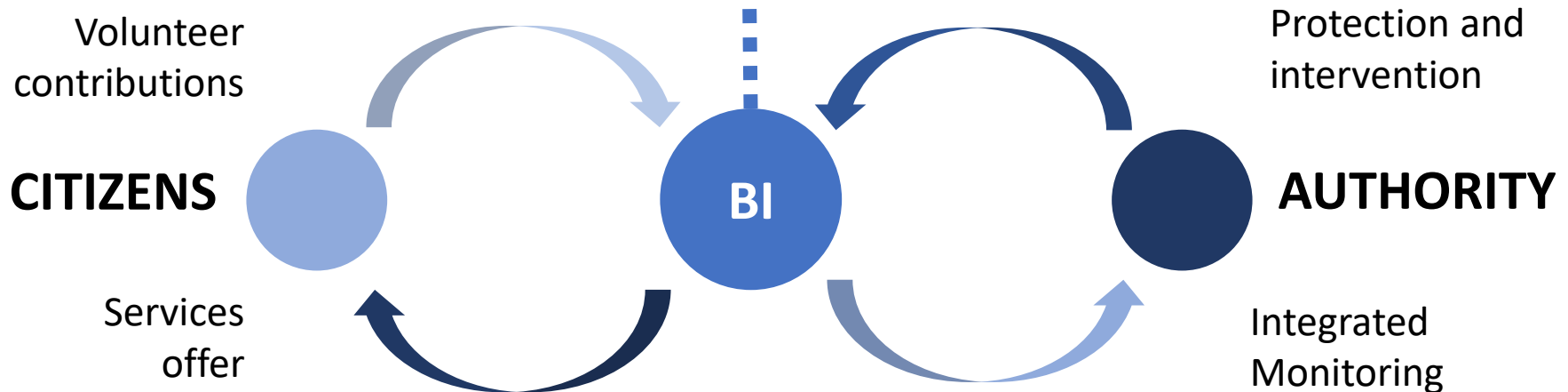
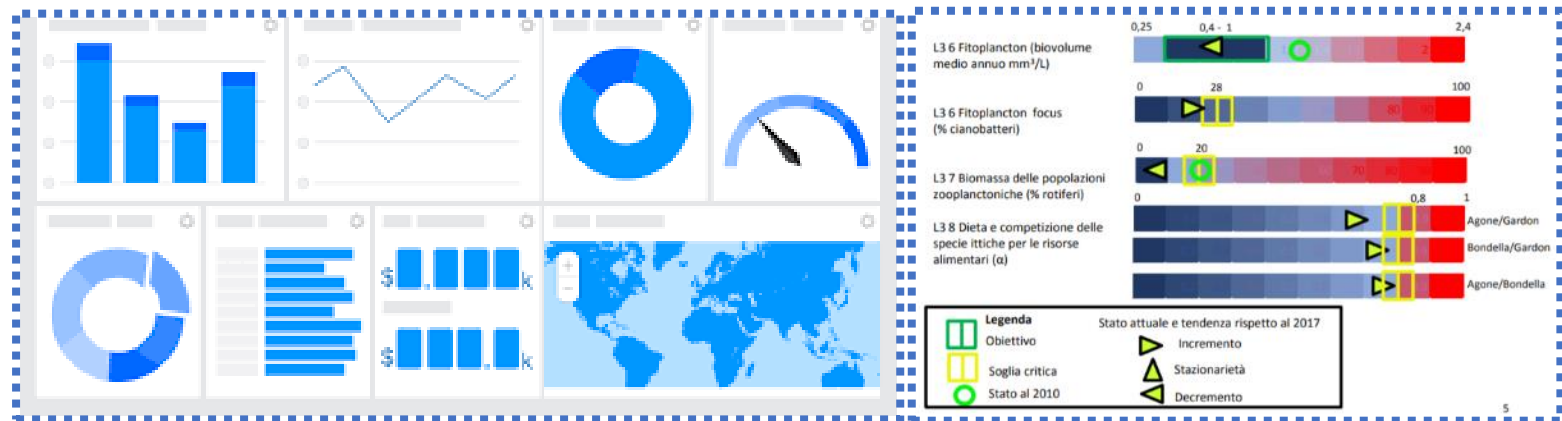


WP4 CS WEB INTERFACE





WP5 BUSINESS INTELLIGENCE PLATFORM





LINK AND CONTACTS

App Download: <https://play.google.com/store/apps/details?id=com.polimi.simile&hl=en>

App Tutorial: <https://www.fondazionepolitecnico.it/wp-content/uploads/2020/03/simile-app-tutorial-ita.mp4>

Project website: <https://www.fondazionepolitecnico.it/en/initiatives/simile/>

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