IDEM

FONDO EUROPEO DI SVILUPPO REGIONALE
P.O.R. 2007 - 2013

REGIONE PIEMONTE

IDEM
Internet of Data Environmental Monitoring

FILIPPETTI
Engineering, IT & Outsourcing

POLITECNICO DI TORINO

CSP
innovazione nelle ICT

ACS
Spin Off

sia

GBIA

IoD IDEM – The project

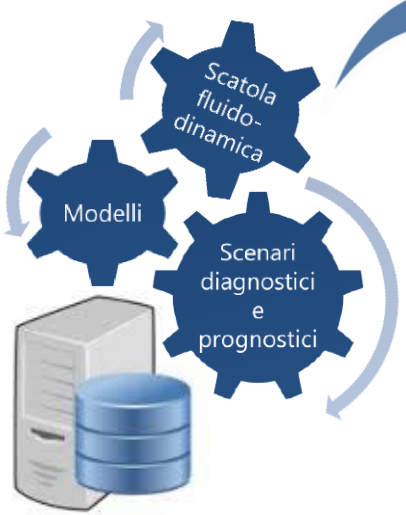
AIM

Studying and developing methods and tools for the continuous monitoring of the impact caused by odour emissions, in order to provide predictive functions that can be used as a support for political and strategic decision-making.

Landfill

PID devices and environmental sensors

Composting plant

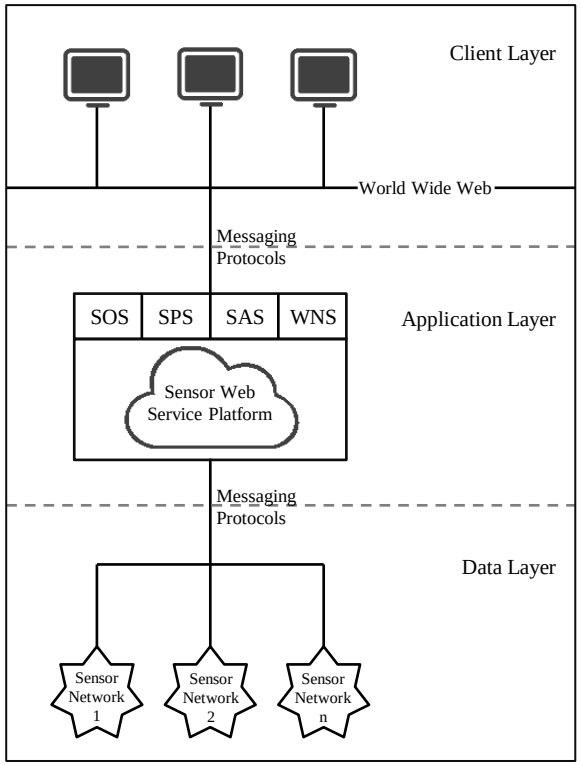


Cromos Sensor Platform

Nowcasting and forecasting scenarios

IoT – Internet of Things

Internet Of Things (IoT) is an emergent concept that refers to have **multiple sensors** connected to the internet that monitor the physical world and interact one each other, making possible through services to access remotely the data and to control the physical world from a distance.

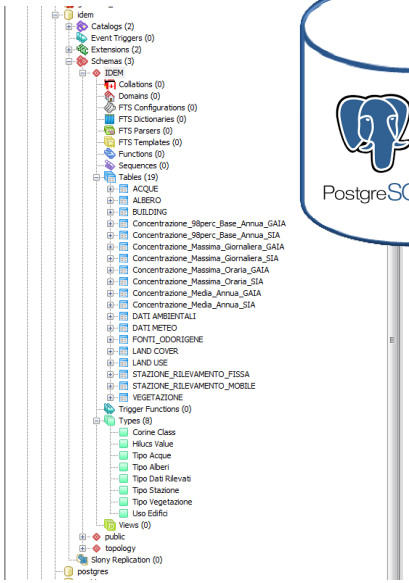


A platform that supports the IoT usually is based on three layers:

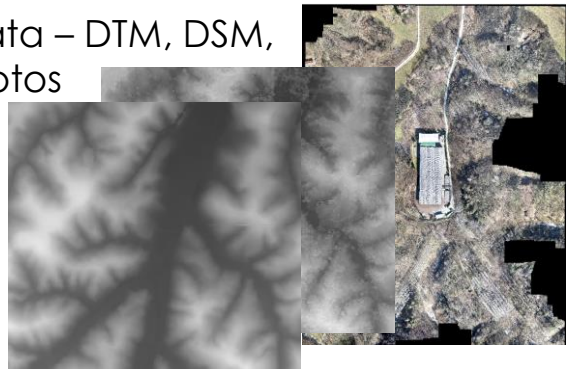
1. the **data layer**, representing the network of smart object;
2. the **application layer**, that is the technologies for storing, manipulate and retrieve the data from sensor network;
3. the **client layer**, where users references services deployed by the application layer, in order to design end-user application across multiple applications domains.

WebGIS – architecture

Vector data –
Postgresql/PostGIS Database



Raster data – DTM, DSM,
Orthophotos



GeoServer

server-side software for sharing geospatial data

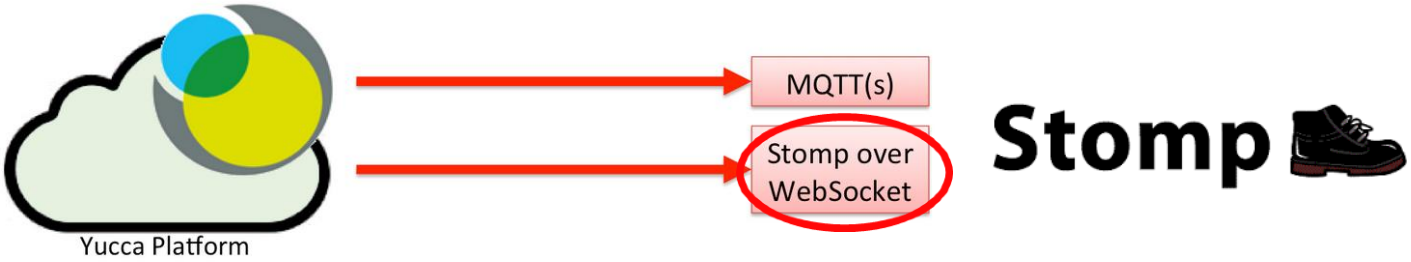
+

Leaflet

client-side library for visualization of geospatial data

WebGIS

Connection with SmartDataNet



Protocol Stomp Over WebSocket

It defines the format of the messages that pass between client and server and allows the server to send notifications to the client without the need to be invoked (push).

Interfacing with the platform SmartDataNet:

Through JavaScript library Stomp.js you define functions for connecting to a undersigned stream (successful connection, connection error, message received)

```
topicsCROMOSSIA = "/topic/output.idem.IDEM_Gateway_SIA_cromos0001";

client = Stomp.client(urlServer);
client.connect("earco" , "e4GrCU24yu" , connectCallBack, errorCallback);


function connectCallBack(x) {
    //gestione dell'avvenuta conessione (es. sottoscrizione coda)
    alert("Connesso alla piattaforma SDN")
    client.subscribe(topicsCROMOSSIA, messageCallback);
}

function errorCallback(x) {
    // gestione degli errori di connessione
    alert("Errore durante la connessione alla piattaforma SDN");
}
function messageCallback(x) {
// gestione del messaggio inviato dalla piattaforma
    var jsText;
```

Connection with SmartDataNet

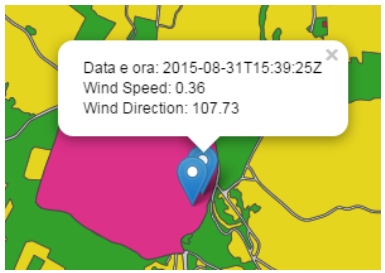
We have chosen to use the **stream "Cromos"** that contains the hourly average of the measures of VOD, measures of wind speed and direction, and sends a message every minute.

Inside the reception message function, the parsing of the JSON message is carried out:

- Transformation of the message in string format;
- Removing part of the string in order to obtain a string containing the JSON message only;
- Parsing of the message through the function JSON.parse.

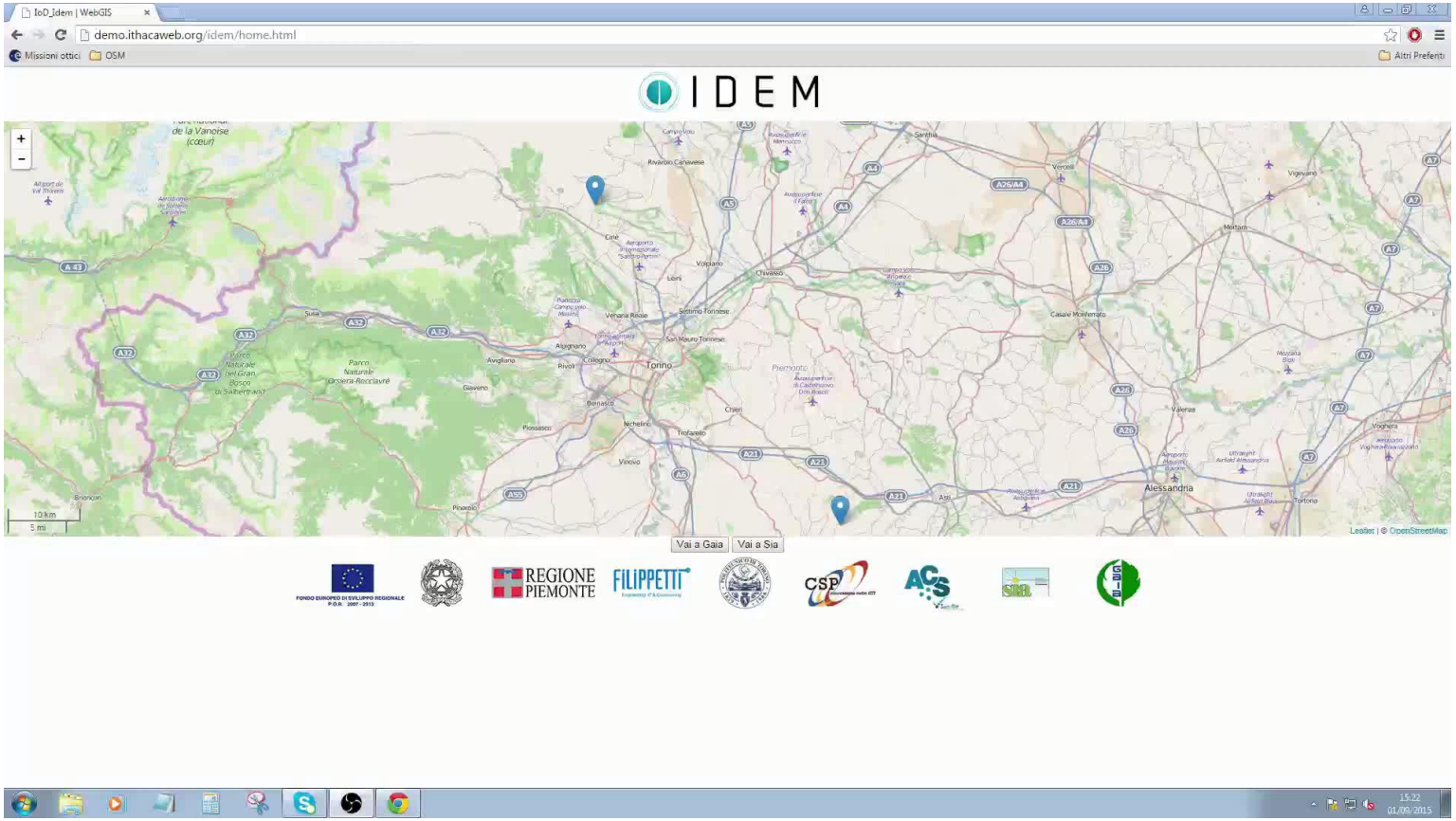
```
<<< MESSAGE
message-id:ID:sdnet-mb1-47738-1438847294303-3079:1:1:1:1744
destination:/topic/output.idem.IDEM_Gateway_GAIA_cromos0002
timestamp:1438954727436
expires:0
subscription:sub-4
persistent:true
priority:4

{"application":"IDEM_Gateway_GAIA","stream":"cromos0002","values":[
        {"time":"2015-08-07T13:39:17Z","components":
                {"distance":"80281.4",
                 "scenario":"06_07_02",
                 "stability_class":"6",
                 "wind_direction":"299.26",
                 "api":"http://192.168.231.54:8091/api/stored/0/0.894079983234406/322.0/
                 4/39.7/60.8/2015/8/7/15/1",
                 "vod_01":"13.4",
                 "vod_02":"3.16",
                 "wind_speed":"0.1",
                 "y":"-0.087241",
                 "x":"0.048877"}
}]}
```



After successful connection, as soon as the client receives the first message from the server, it is translated and displayed on the page through a popup, the content of which is updated every minute.

WebGIS



http://demo.ithacaweb.org/idem/home.html