

SW DATA MANAGEMENT FOR GEOTECHNICAL MONITORING “WEB MONITORING SYSTEM”



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WHAT IS THE WMS?

The WMS is a Software Platform used to validate, process, convert, and automatically manage dynamic, geotechnical, structural and hydraulic monitoring data for automatic, semiautomatic, and manual monitoring systems.



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DATALOGGER and REDOUT UNITS

DATA ACQUISITION UNIT
(Local or Remote)



REDOUT UNITS
(Manual)



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WIRELESS COMMUNICATION SYSTEM FOR DATA TRANSMISSION

This system is able to acquire, memorise, and automatically archive electronic data from various instruments. The instruments' electronic signals are acquired by a Data Acquisition Unit and are, then, sent to a central Server through F/O, LAN, GPRS, Radio, and Satellite connections.



GSM NETWORK



RADIO MODEM



**UMTS/3G
NETWORK**



GPRS NETWORK



**SATELITE/FO
CONNECTION**

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DATA TRANSMISSION

Dataloggers



Router 3G



Modem
GSM/GPRS

Data Pack

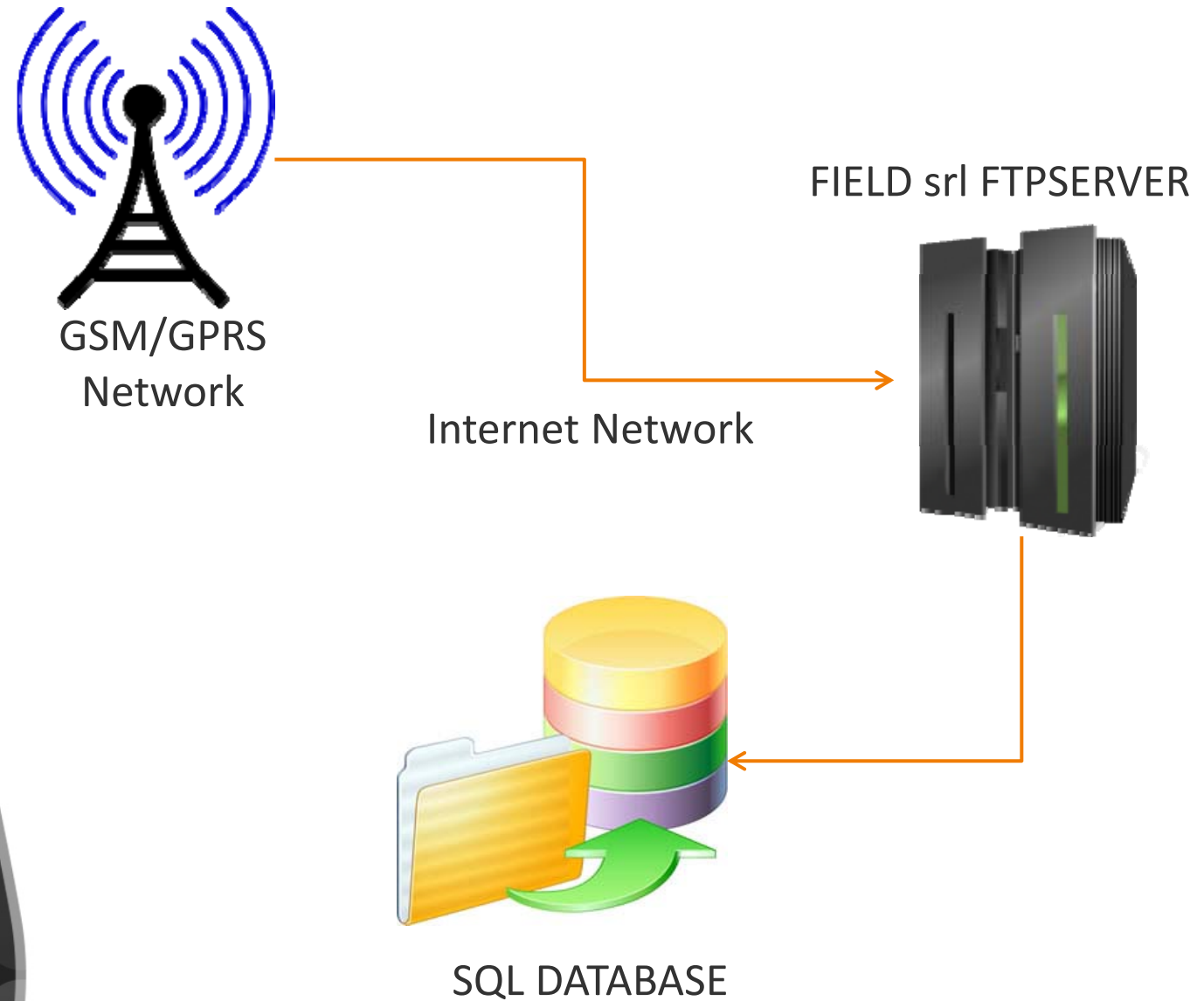


GSM/GPRS/3G
Network

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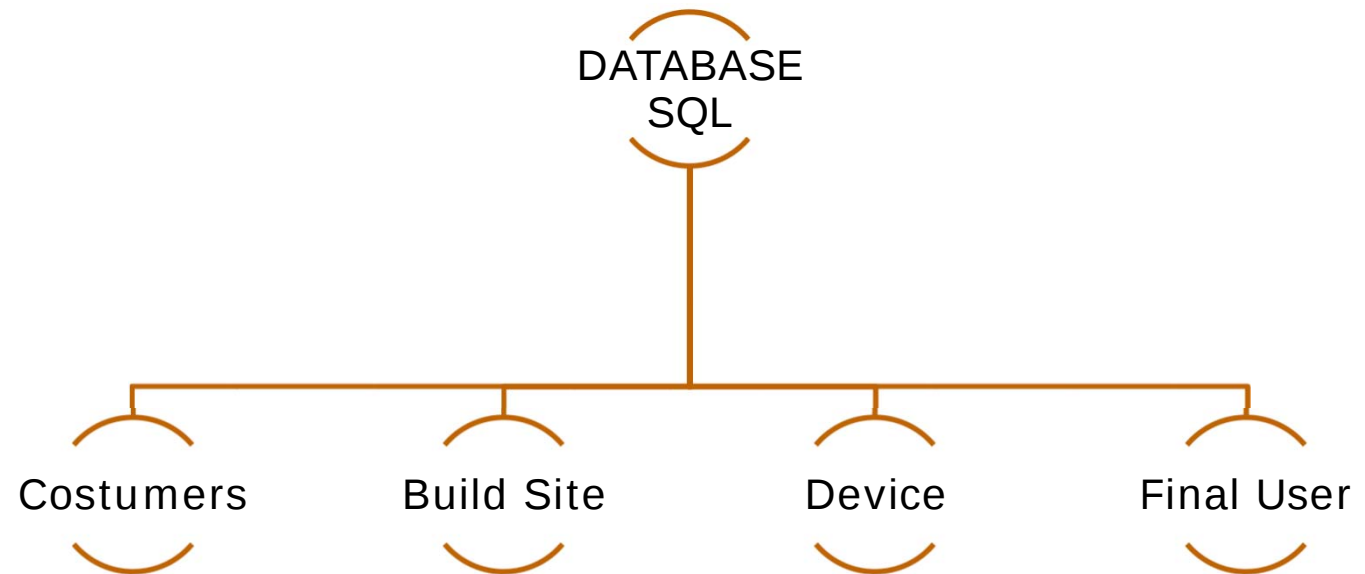
DATA TRANSMISSION



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DATA ORGANIZATION

Data from different monitoring systems are held in a SQL Database



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DATA PROCESSING

The data undergoes a first automatic validation to delete any spikes and/or anomalous readings; then Data are automatically converted into the appropriate technical units.

Electrical data

Data Transformation
with Linear or
polynomial sensibility

Engineering unit
(m, kN, kPa, °, ...)



**DATA
VALIDATION**

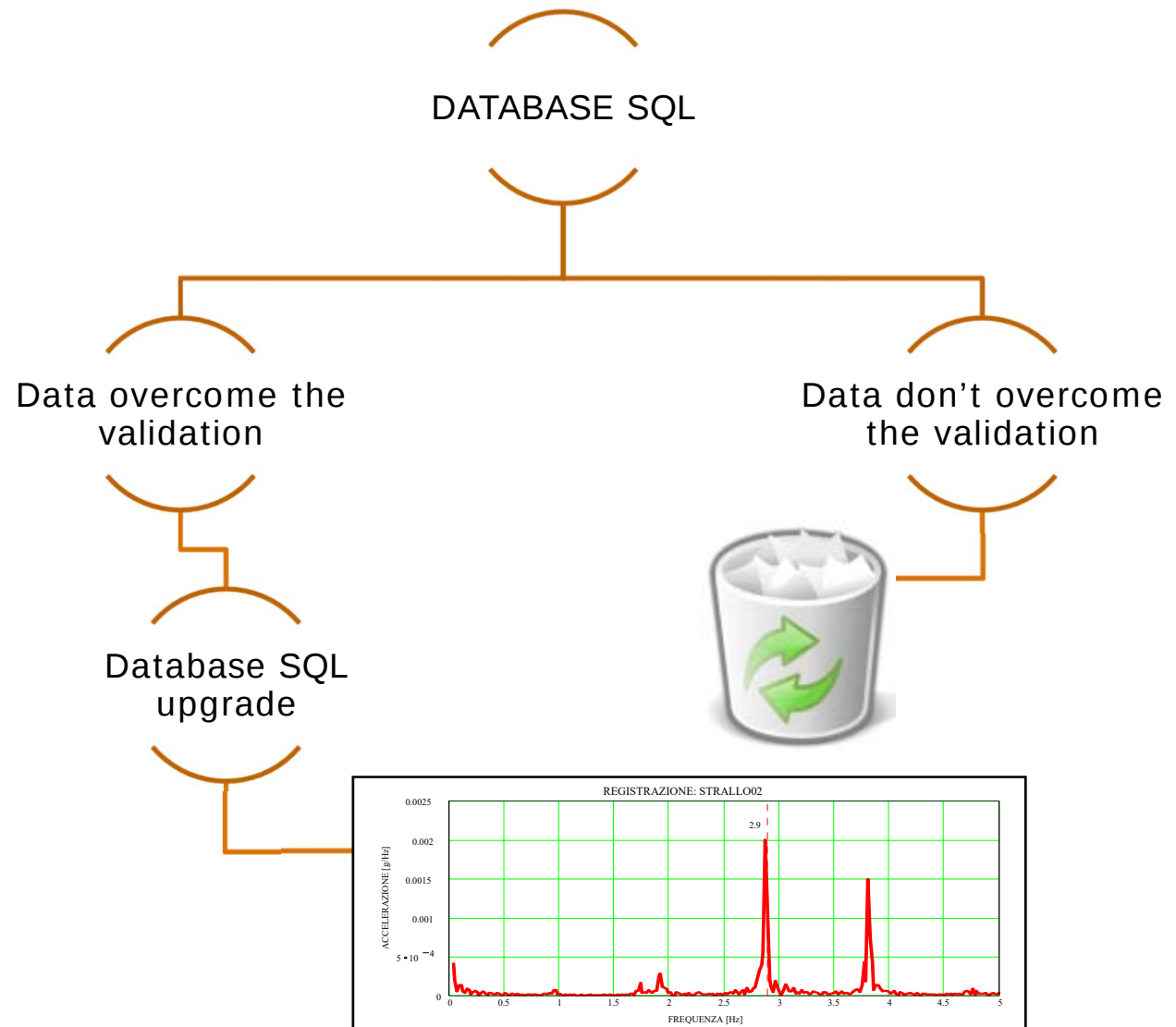
Execution of data Analysis:

- automatic directly by the system
- performed by skilled professionals

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DATA PROCESSING



Data are Plotted

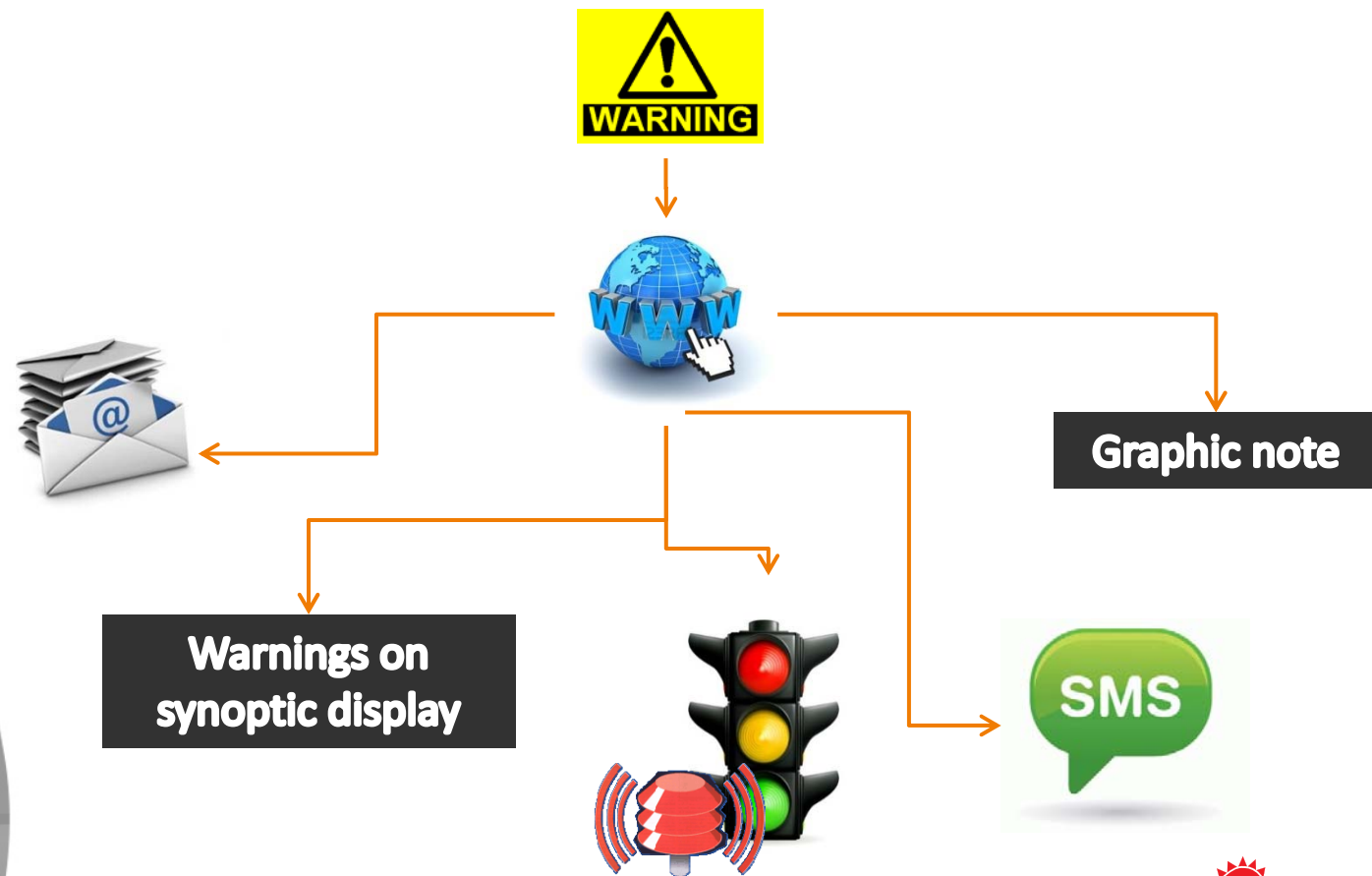
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WARNING SYSTEM

Automatic data Checking and Comparison with the Warning Thresholds

When the warning thresholds are overcome



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WMS MAIN FEATURES

- Visualize and automatically **Convert** data;
- **Automatically**, **Semiautomatically**, or **Manually** validate data;
- Visualize and analyze raw, processed, and plotted data in real-time, **24/7**;
- Completely integration with **dynamic**, hydrometeorological, and **topographical** systems;
- Automatically issue and **Configure Reports**;
- Generate **graphs** (compare measurements from different types of instruments);
- Set advanced **alarm** configuration by way of SMS/e-mail/siren/etc.;
- **Interactive plans** with alarm status of instruments with automatic status updates;
- **Personalize** graphs and visualization options according to requirements and needs;
 - Digital **Zoom** function;
 - Automatically prepare and send occasional **Reports**;
 - **Georeferencing**;

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WMS MAIN FEATURES

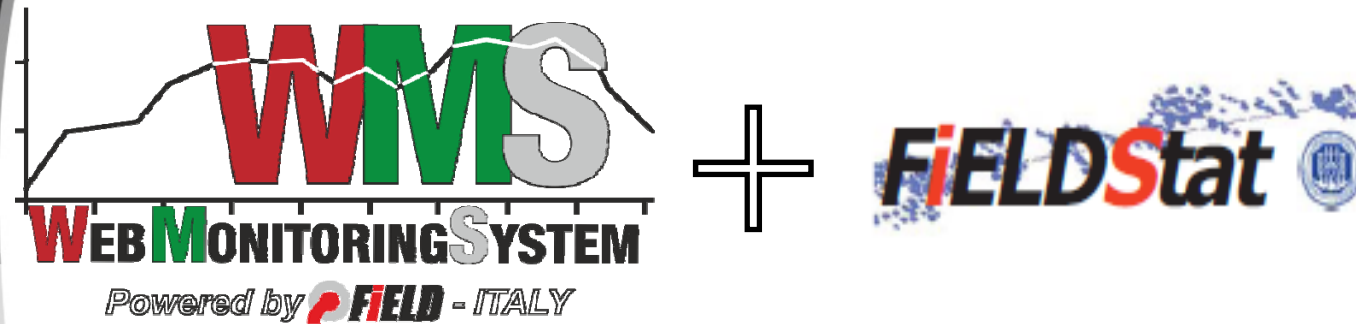
- Import CAD tables, images, pictures, etc.;
- View images in Google Maps, Google Earth, and 3D Rendering;
- Set Different access Levels and Privileges using a login (ID and password);
- **Algorithmic and Statistic** processing of data according to covariant effects such as thermal compensation through the Fieldstat2 program based on the least squares method;
- Integrates with EDF algorithm to calculate the statistical prediction of expected data (piezometer);
- View images and video from **CCTV**;
- Option to **filter** and **save** data and images in different formats;
- **Manually or Directly import data** to an .xls archive through a portal or by way of e-mail.

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Statistical Mathematical Algorithm

processing of data according to covariant effects



It is loaded into the SQL server, so it can run in parallel with the normal data processing and produce a real-time graphs without for example the Temperature Influence.

Final users can view in real-time, in a web portal, a first graphical report that show raw data and a second one statistical elaboration

STATISTICAL APPLICATION for temperature compensation



What can do?

Is able to detect by the best correlations between temperature (or others covariants) and measures, with statistical methods.

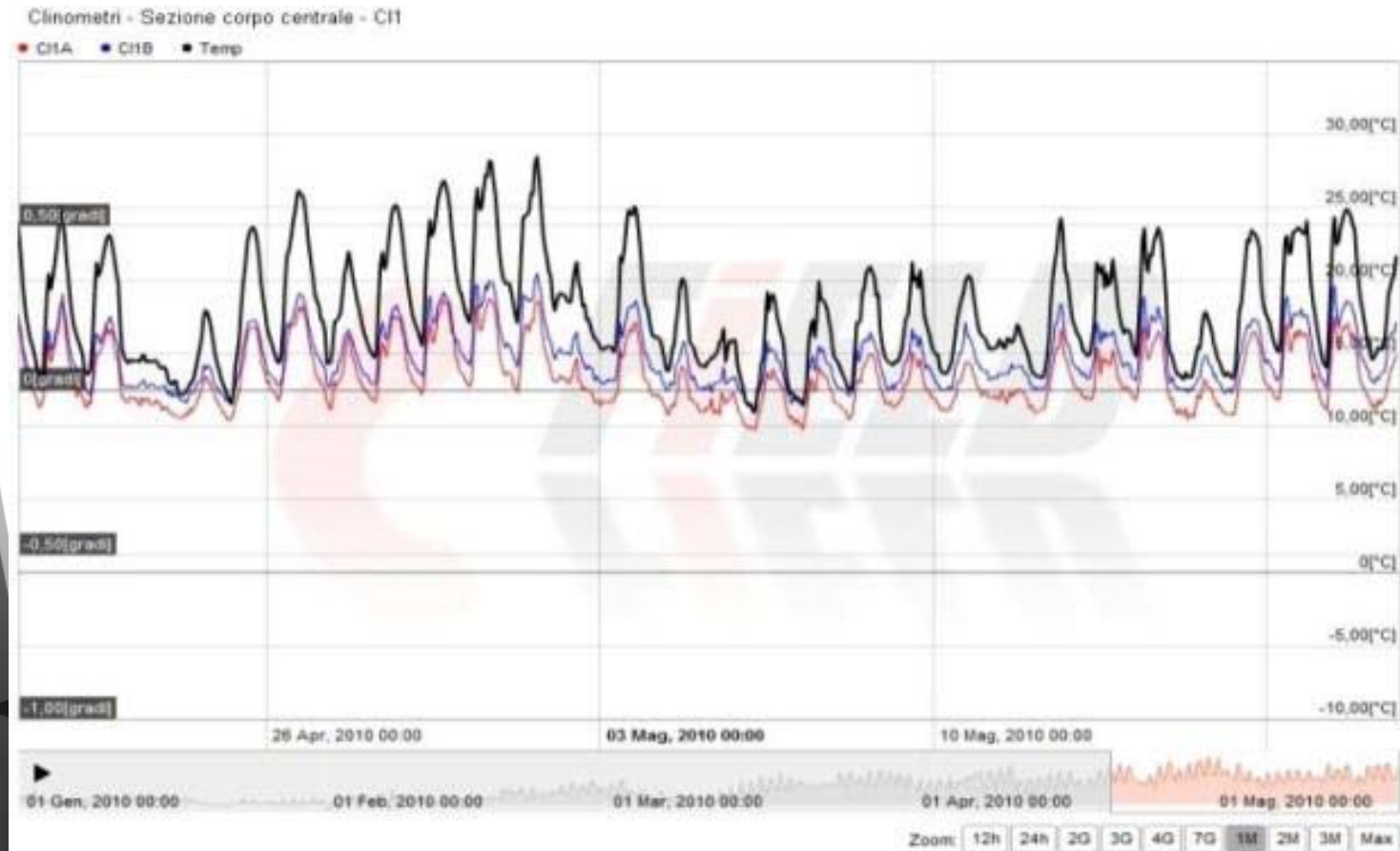
It can delete the temperature effect on the measures and it permit to have a correct visualization of data

Based to a statistical algortim application developed and certified by Math Bergamo University

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STATISTICAL SOFTWARE for temperature compensation



Example without using Fieldstat

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STATISTICAL SOFTWARE for temperature compensation

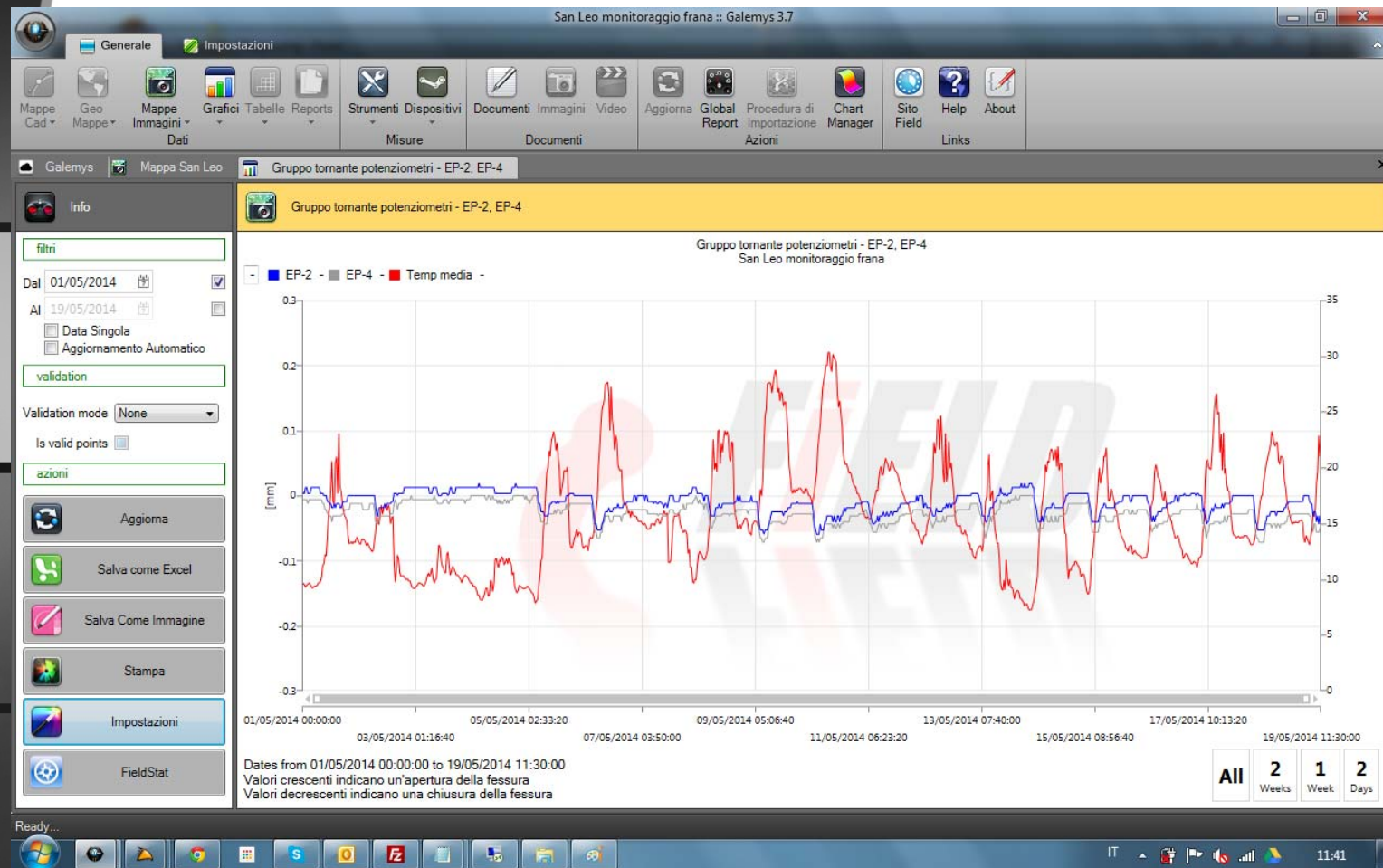


Example using Fieldstat

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STATISTICAL SOFTWARE for temperature compensation



Example without using Fieldstat

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STATISTICAL SOFTWARE for temperature compensation



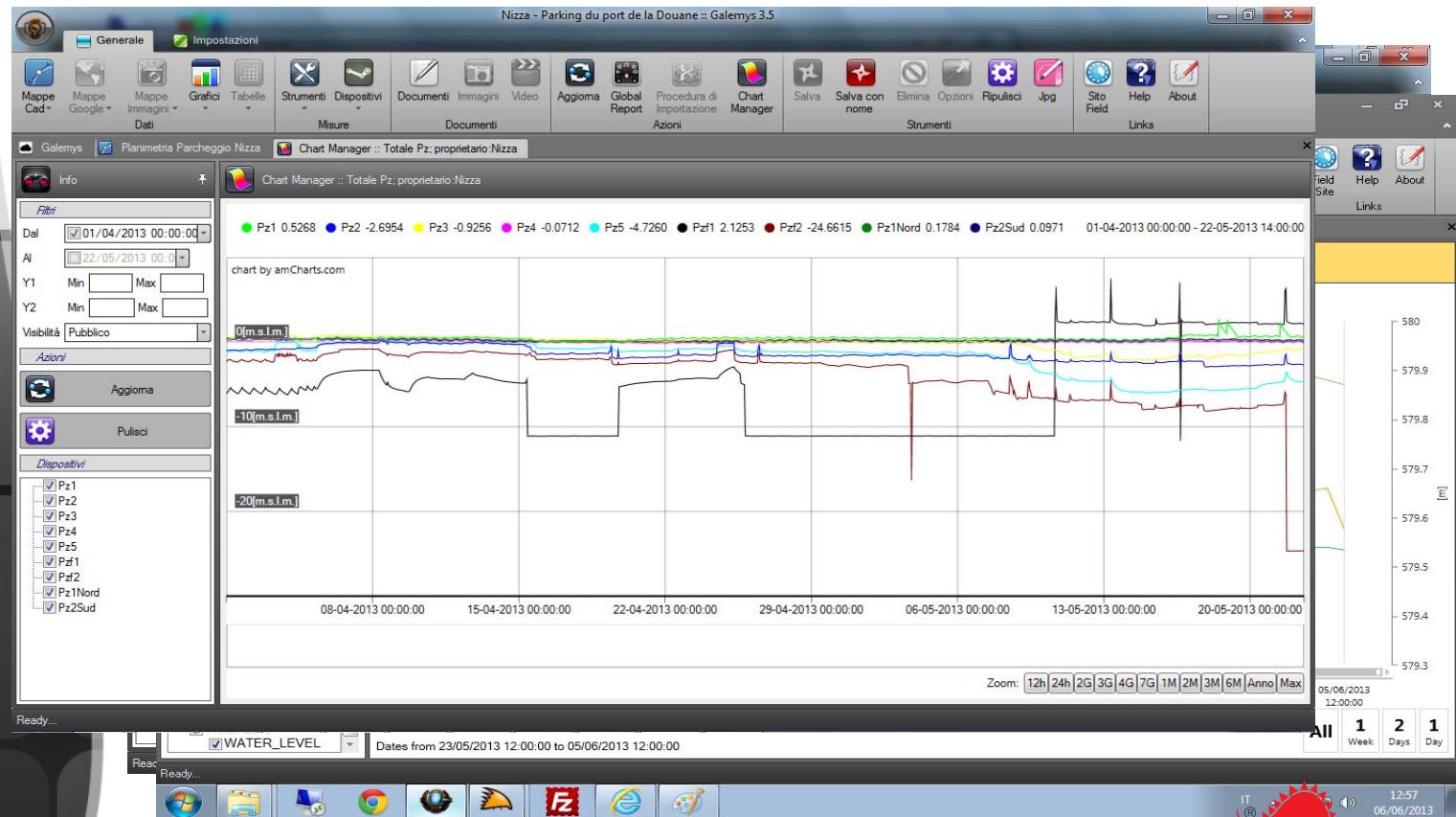
Example using Fieldstat

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CHART MANAGER FUNCTION

The Chart Manager lets you view various instruments in one single chart. You can decide which instruments to view by selecting them from a complete list of all of the instruments installed. You can also compare different instruments with different units of measure using the 3 available axes.

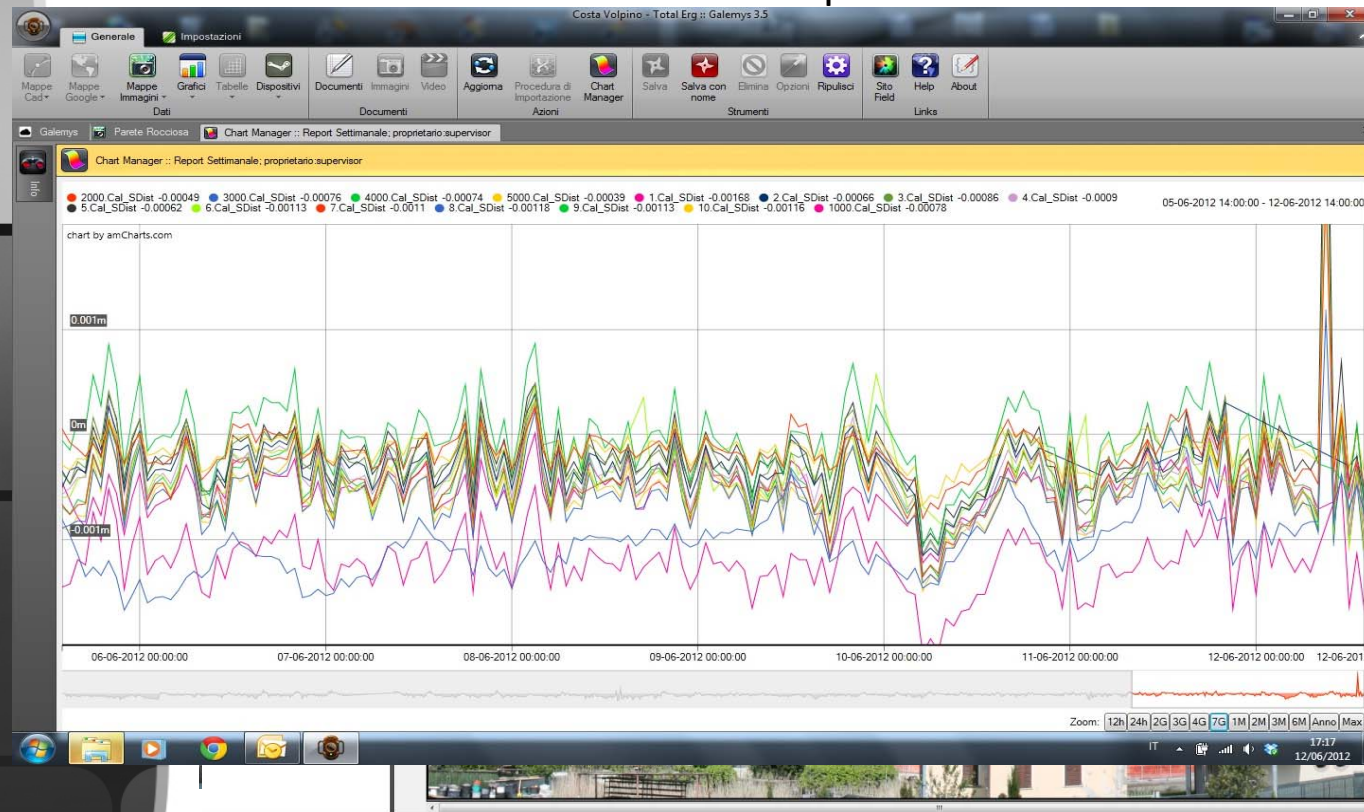


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IMPLEMENTATION WITH ROBOTIC TOTAL STATIONS

In an integrated monitoring system consisting of geotechnical (conventional gauges) and TOPOGRAPHICAL TOTAL STATIONS in a fixed position, robotic Stations, being automatic, can send data (SQL database) directly to WMS data through the use of 3G router radio modem, with optical fiber and manual discharge. It will be the same WMS that will take care of the transformations of coordinates in displacement.



New perspectives through the "Center for Monitoring the Impact of Infrastructures on the Environment"

JW Marriott Bucharest Grand Hotel, Bucharest, 6th November 2015

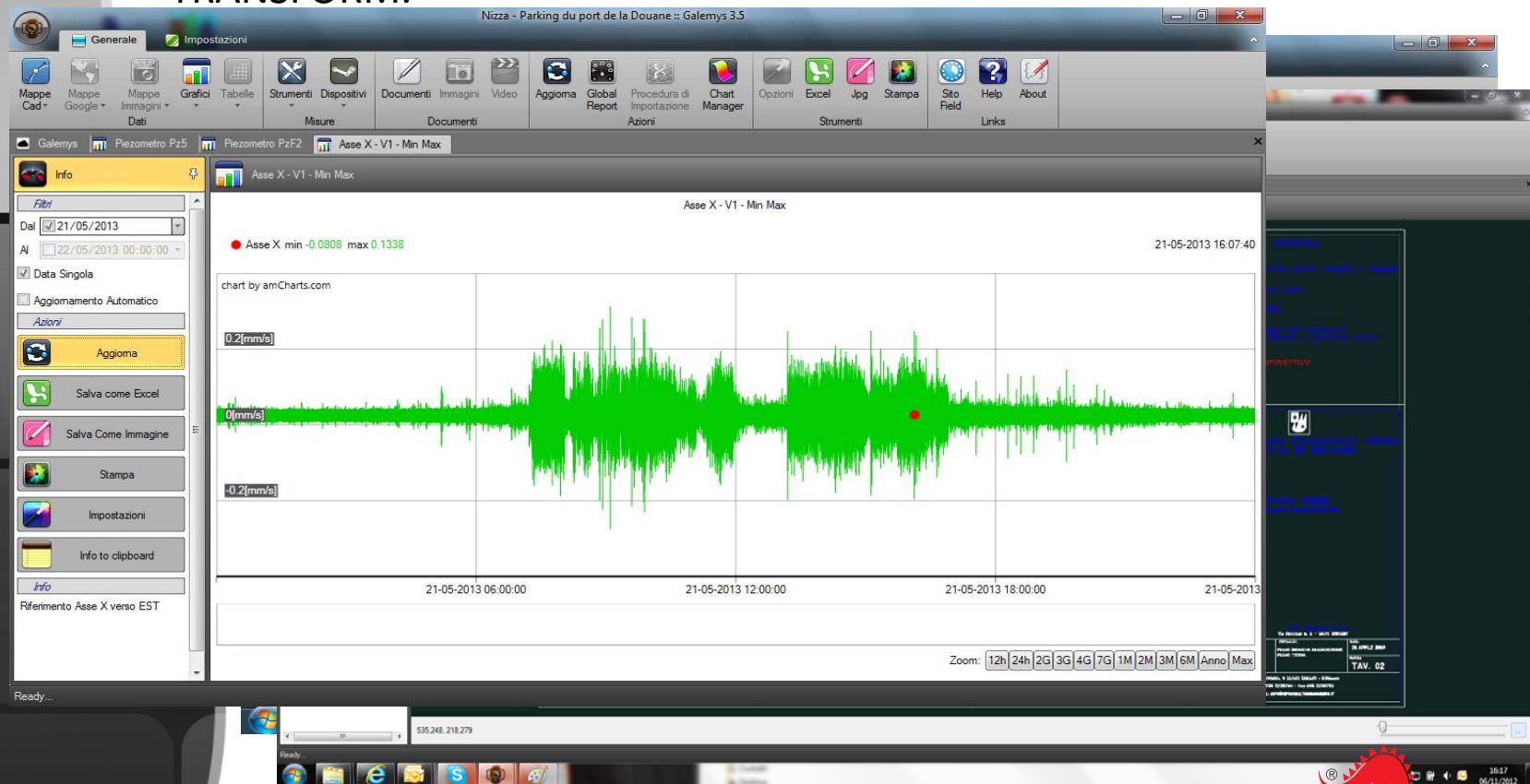


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SISGEO
LATINOAMERICA

IMPLEMENTATION WITH DYNAMIC STATIONS

In a integrate monitoring system consisting of geotechnical (conventional gauges) and SEISMIC-ACCELEROMETER STATIONS, being automatic, can send data (SQL database) directly to WMS data through the use of 3G router, radio modem, with optical fiber and manual discharge. It will be the same WMS that will take of MIN, MAX, EVENTS and FOURIER TRANSFORM.



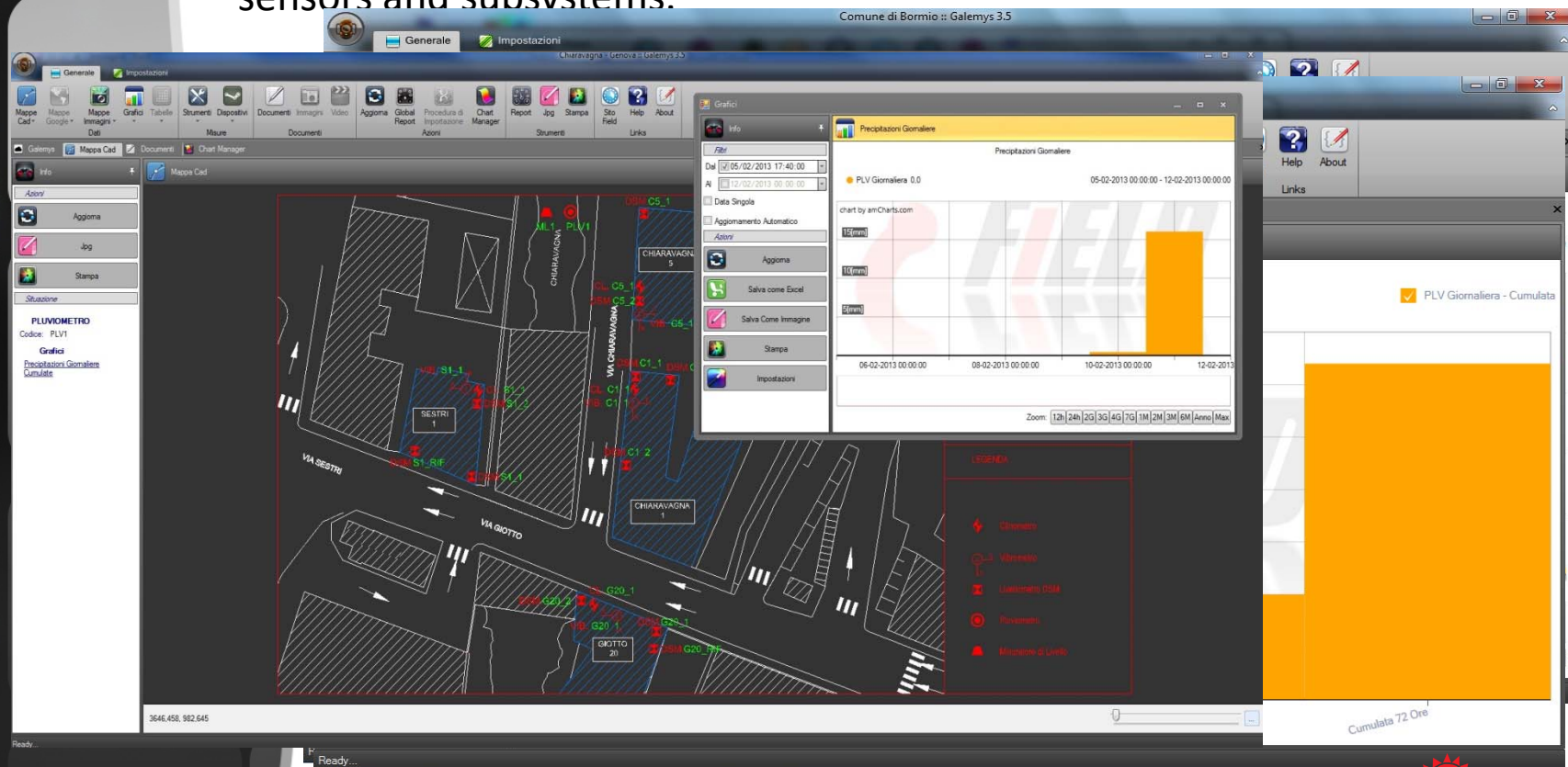
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IMPLEMENTATION WITH HIDROMETEROLOGICAL STATIONS

In an integrate monitoring system consisting of geotechnical (conventional gauges) and HIDROMETEO STATIONS, being automatic, can send data (SQL database) directly to WMS.

It will be the same WMS that will take care of data management of all sensors and subsystems.



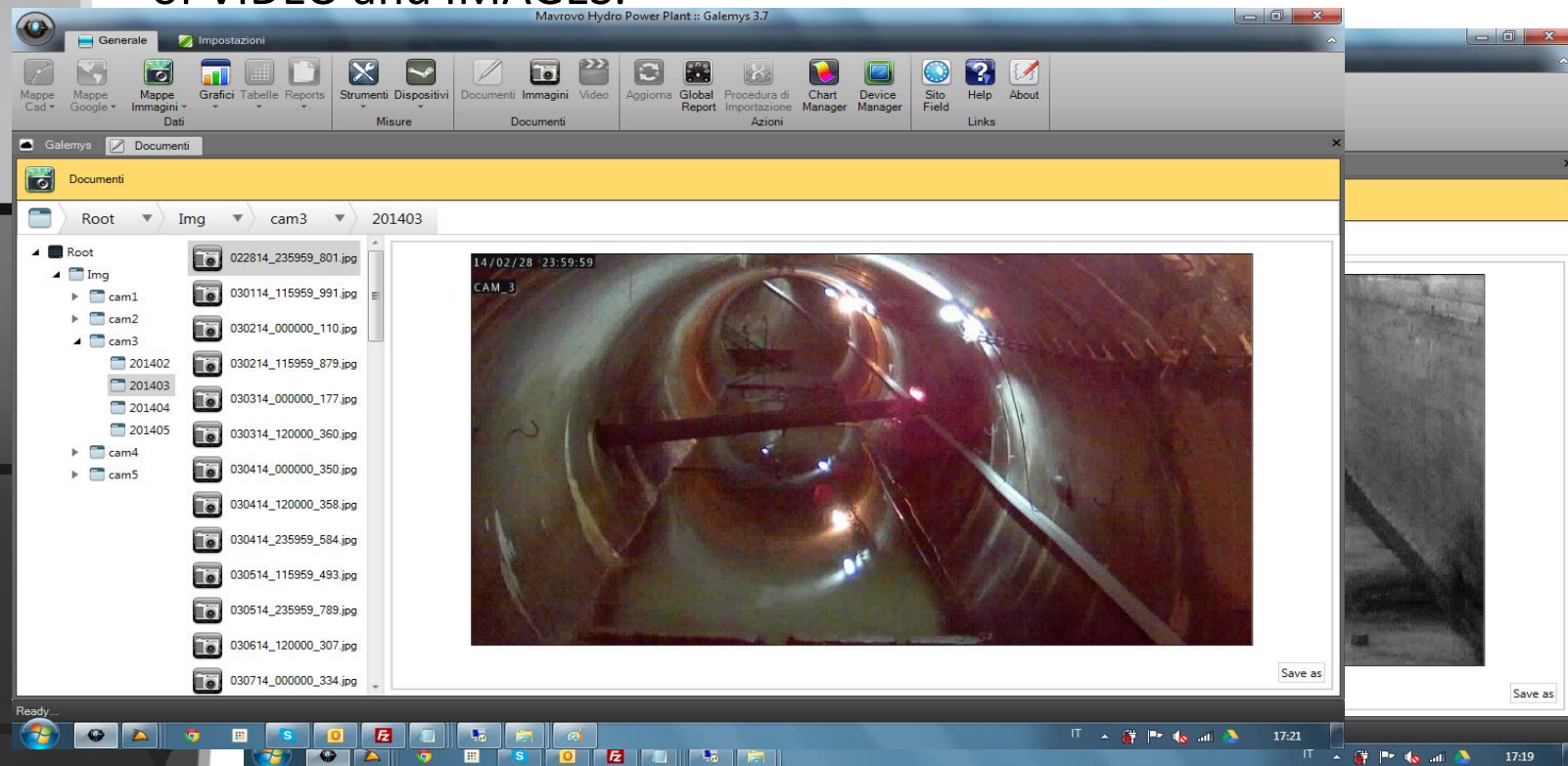
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IMPLEMENTATION WITH VIDEO SURVEILLANCE SYSTEM

In a integrate monitoring system consisting of geotechnical (conventional gauges) and CCTV SYSTEM, being automatic, can send data (SQL database) directly to WMS.

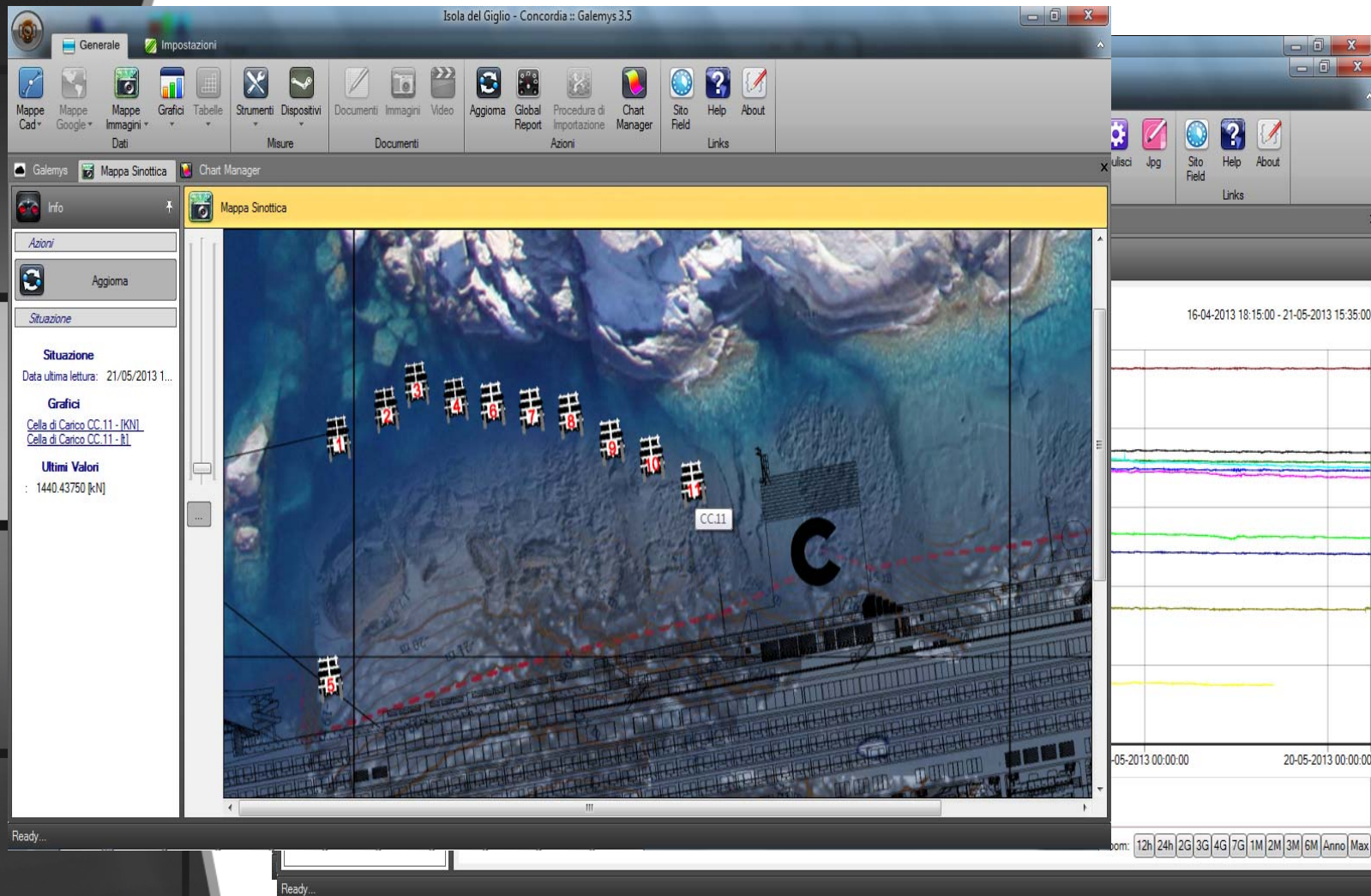
It will be the same WMS that will take care of data management of VIDEO and IMAGES.



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CASE HISTORY 1



Costa Concordia Wreck Removal

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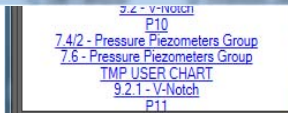
CASE HISTORY 2



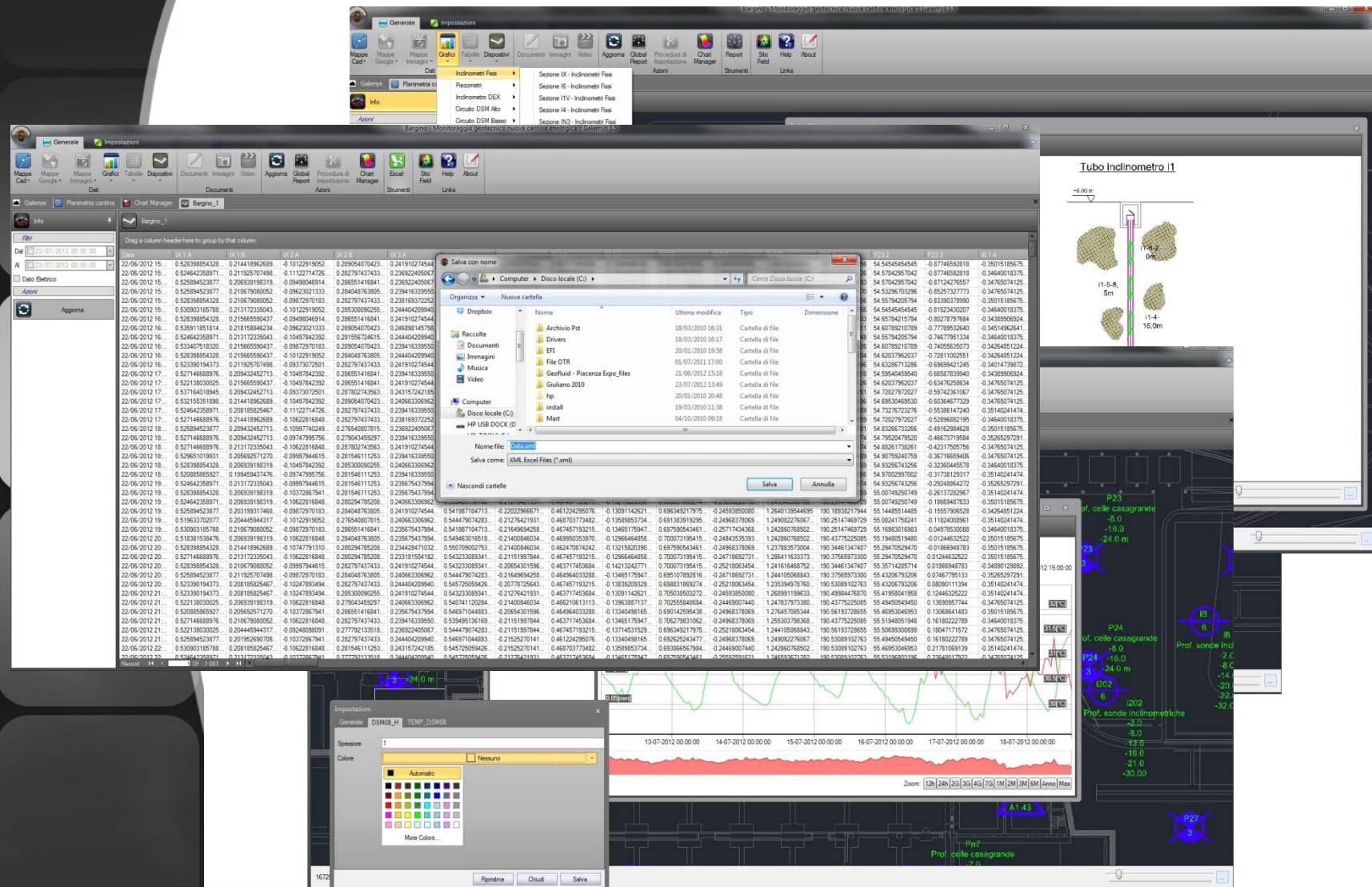
San Leo lanslide

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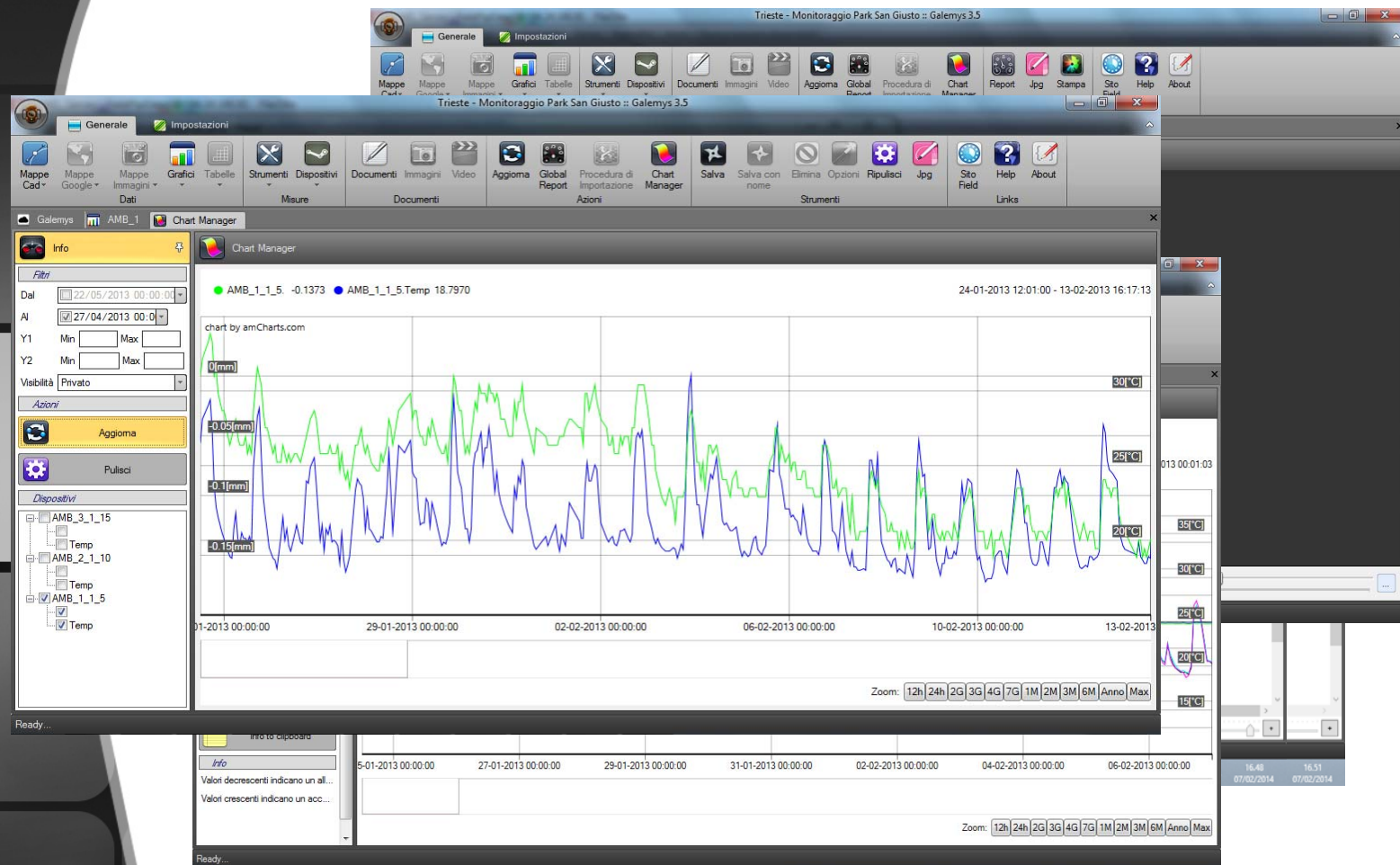
CASE HISTORY 4



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CASE HISTORY 5

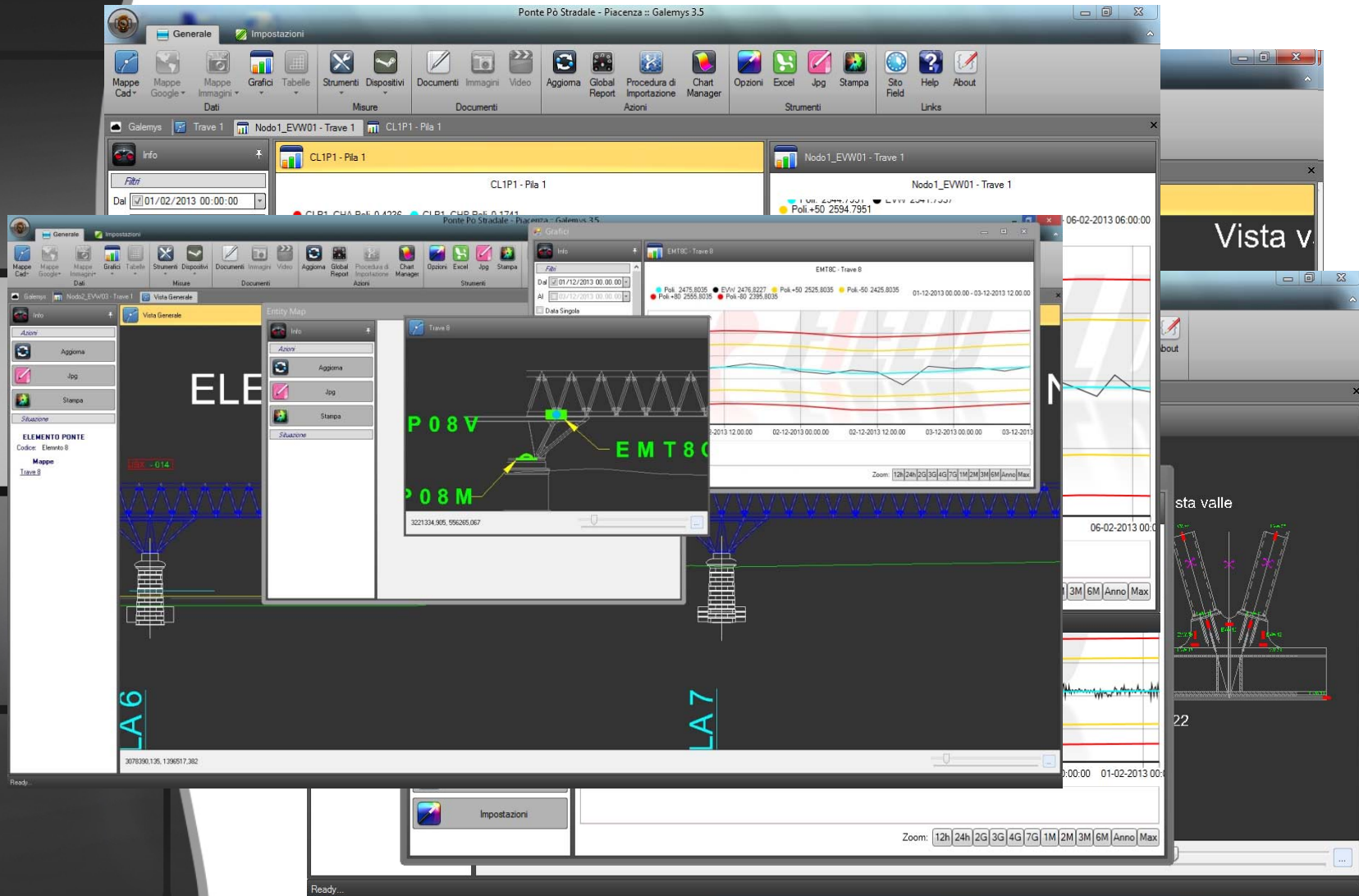


Trieste Underground parking

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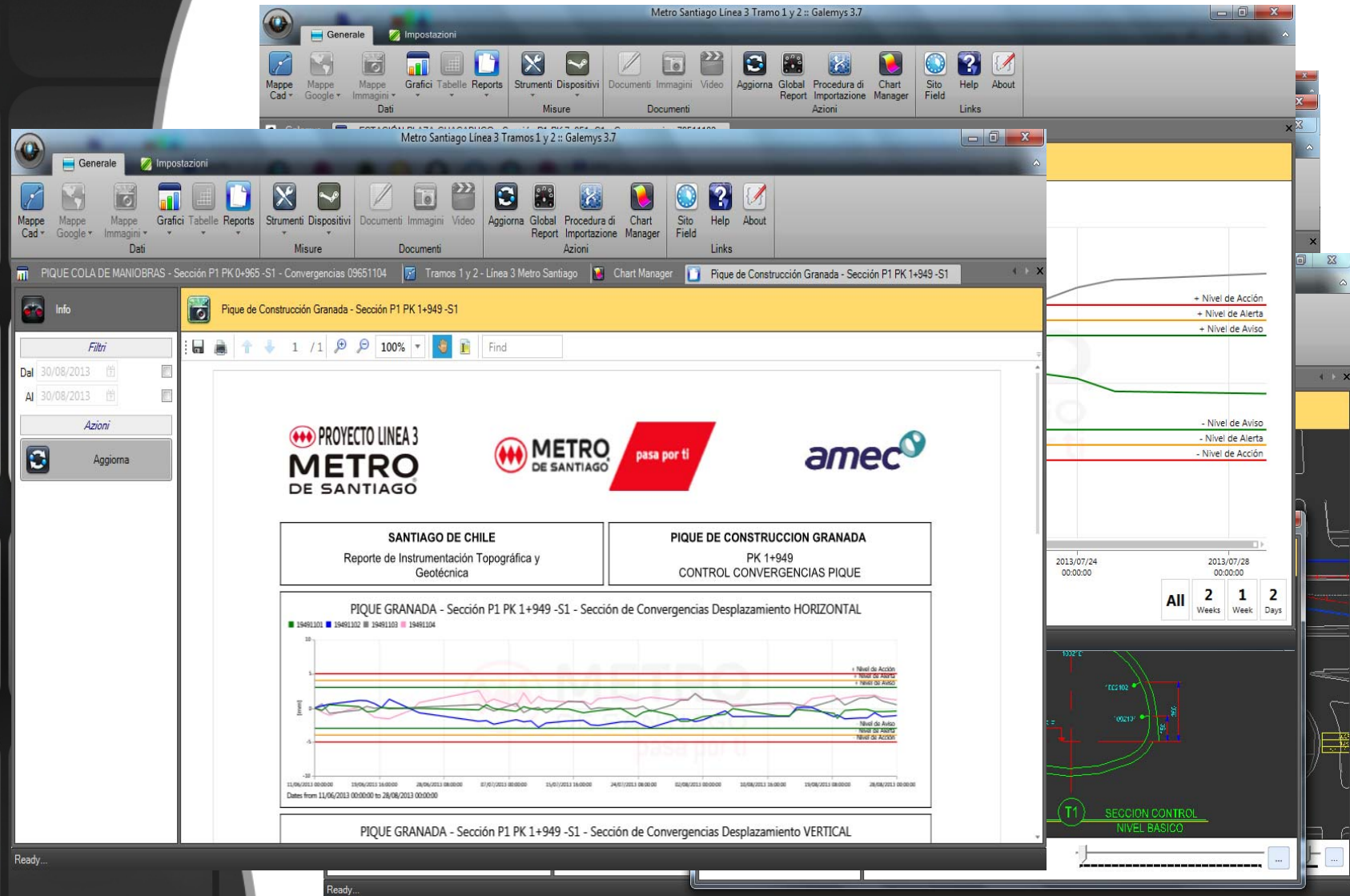
CASE HISTORY 6



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CASE HISTORY 7



SANTIAGO METRO - CHILE

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www.latinoamerica.sisgeo.com

THANK YOU FOR ATTENTION

Any Question?

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