



WARMER

Water Risk Management for Europe and Sensor Web

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WARMER project

Project partners:

- SYSTEA SpA, Italy
- Politechnika Warszawska, Poland
- Universitat Autònoma de Barcelona, Spain
- Research Institute of Chemistry of St. Petersburg University, Russia
- Universitaet fuer Bodenkultur Wien, Austria
- Nansen Environmental and Remote Sensing Center, Norway
- YSI Hydrodata, UK
- University of Aberdeen, UK
- Institute of Electron Technology, Poland



WARMER project goals

Research, development and field test of an innovative water quality monitoring system:

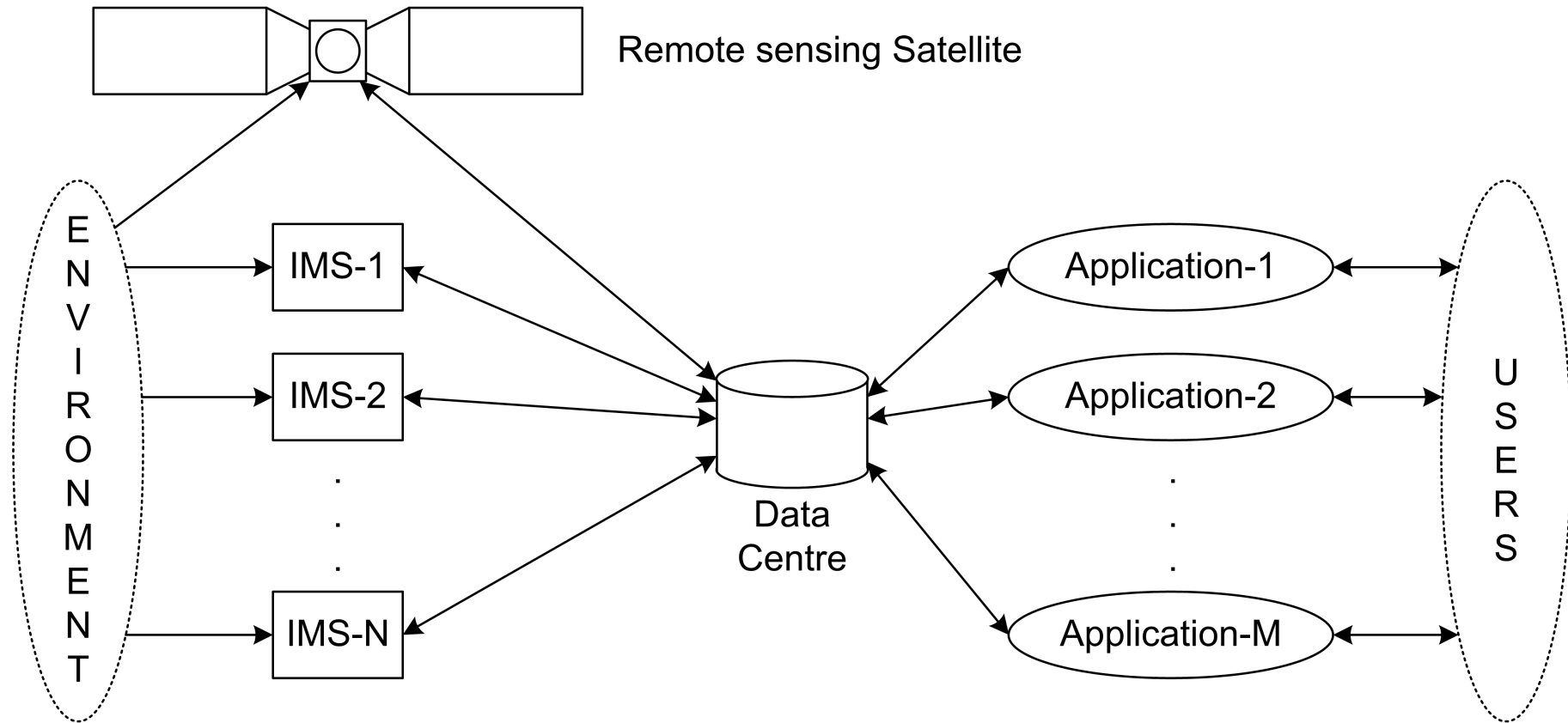
- Modular automated in-situ probes
- Integrated in a field deployable monitoring buoy
- Correlate field measurement data with remote sensing data on a Web based management system

The new water monitoring system will:

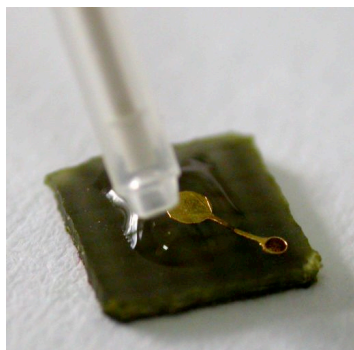
- Act as a short-medium term decision tool
- Manage hazardous pollution events in coastal areas and large rivers



WARMER system overview



Chemical sensors



Potentiometric sensors

NO_3^- , NH_4^+ , K^+ ,
 Na^+ , Cl^-

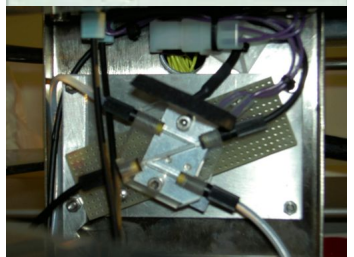


Pb^{2+} , Cd^{2+} , Cu^{2+}
 Hg^{2+} , Fe^{3+} , Cr^{6+}



Stripping voltammetry sensors

Pb^{2+} , Cd^{2+} , Cu^{2+} , Zn^{2+}



Miniaturized colorimetric flow-cell with fibre optics

NH_3 , NO_2 , PO_4

Prototype miniaturized
chemical sensors

Integrated in modular
flow-cells



Water monitoring buoy

- New multiparametric measuring probes
 - Automated analytical measuring procedures
 - Internal calibration and sensor conditioning
 - Commercial multiparametric water quality measuring probes
 - Physical sensors
 - Suitable for use in large rivers or coastal areas
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- GPS module
 - TCP/IP over GPRS for remote data transmission and user reconfiguration
 - Data visualization and validation over the Internet
- <http://www.zetaced.com>



Web interface

- Measurement data will be automatically transmitted to a **Web server**
- User will be able to easily **analyse and validate** collected data via Internet
- Specific in-situ data will be combined with **remote sensing data**, automatically collected from satellites and processed using the DISMAR Web based system
- Spatial and short-medium term **water pollution forecasts** will be produced to assist the user to make decisions on accidental spills in natural resource water bodies (coastal areas, large rivers).



In-situ Measurements Properties

- Measurements come as a tuple which consists of at least: location, time stamp, and value.
- High temporal resolution
- High spatial resolution
- Obtaining an overview of a large area, such as a marine environment requires a large number of IMS and is therefore very expensive



Remote Sensing Measurements Properties

- Measurements come in the form of raster images
- Low temporal resolution
- Low spatial resolution
- Depending on sensor, measurements of certain areas of interest may not be possible because of weather conditions (Clouds)



Combining both types of measurements has advantages

- Remote sensing is excellent for monitoring large areas (eg. marine environment)
- In-situ sensing allows the monitoring of critical points as well as rivers and small lakes
- Both measurements complement each other, thus providing an overall view of the current water quality situation



How to combine and present both types of measurements

- In-situ measurements need to be converted into a geographical representation / image
- Remote sensing and the geographical representation of in-situ measurements need to be combined
- We have chosen to use the DISPRO system (developed by NERSC - Nansen Environmental and Remote Sensing Center, Norway) to achieve this

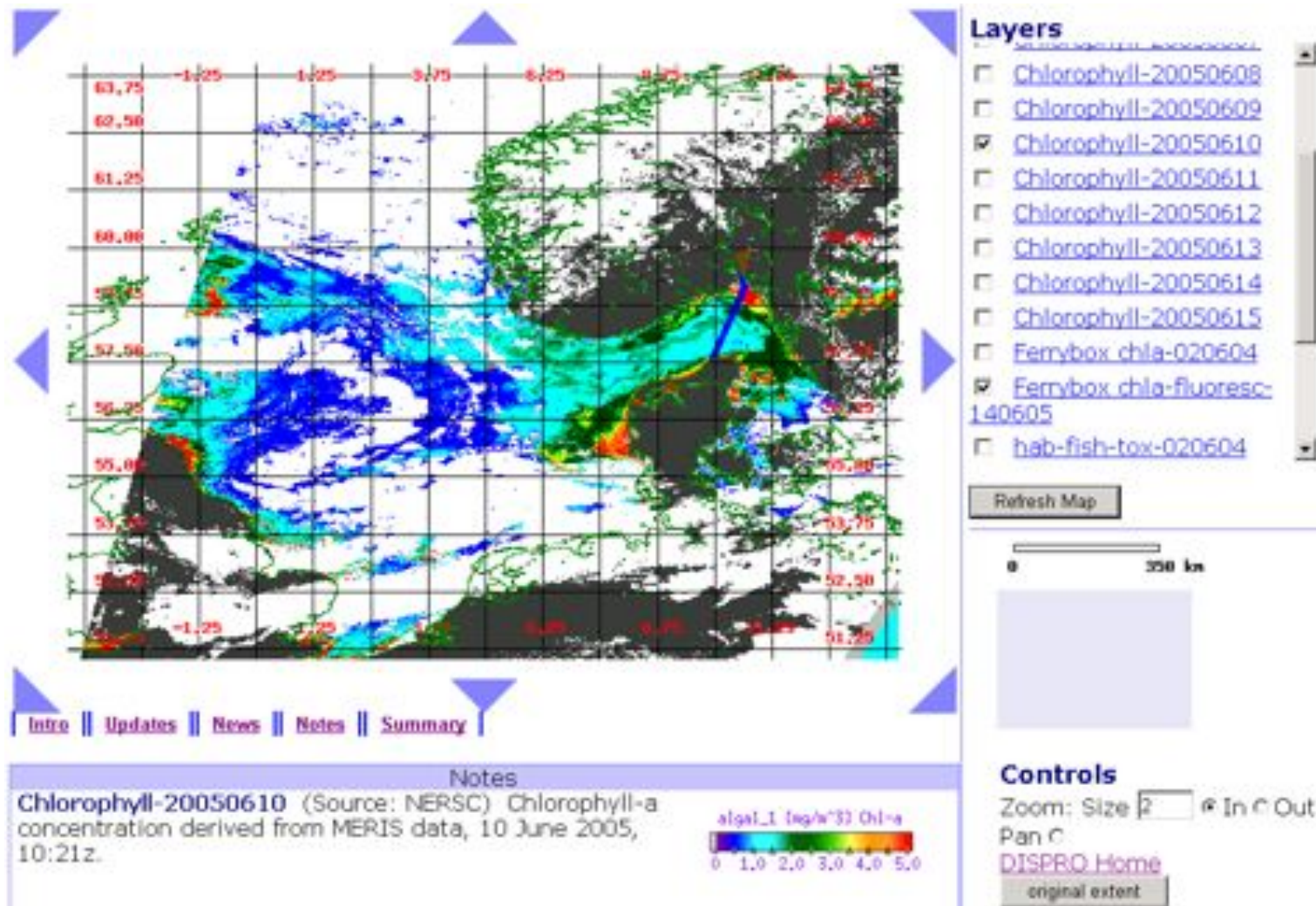


What is DISPRO

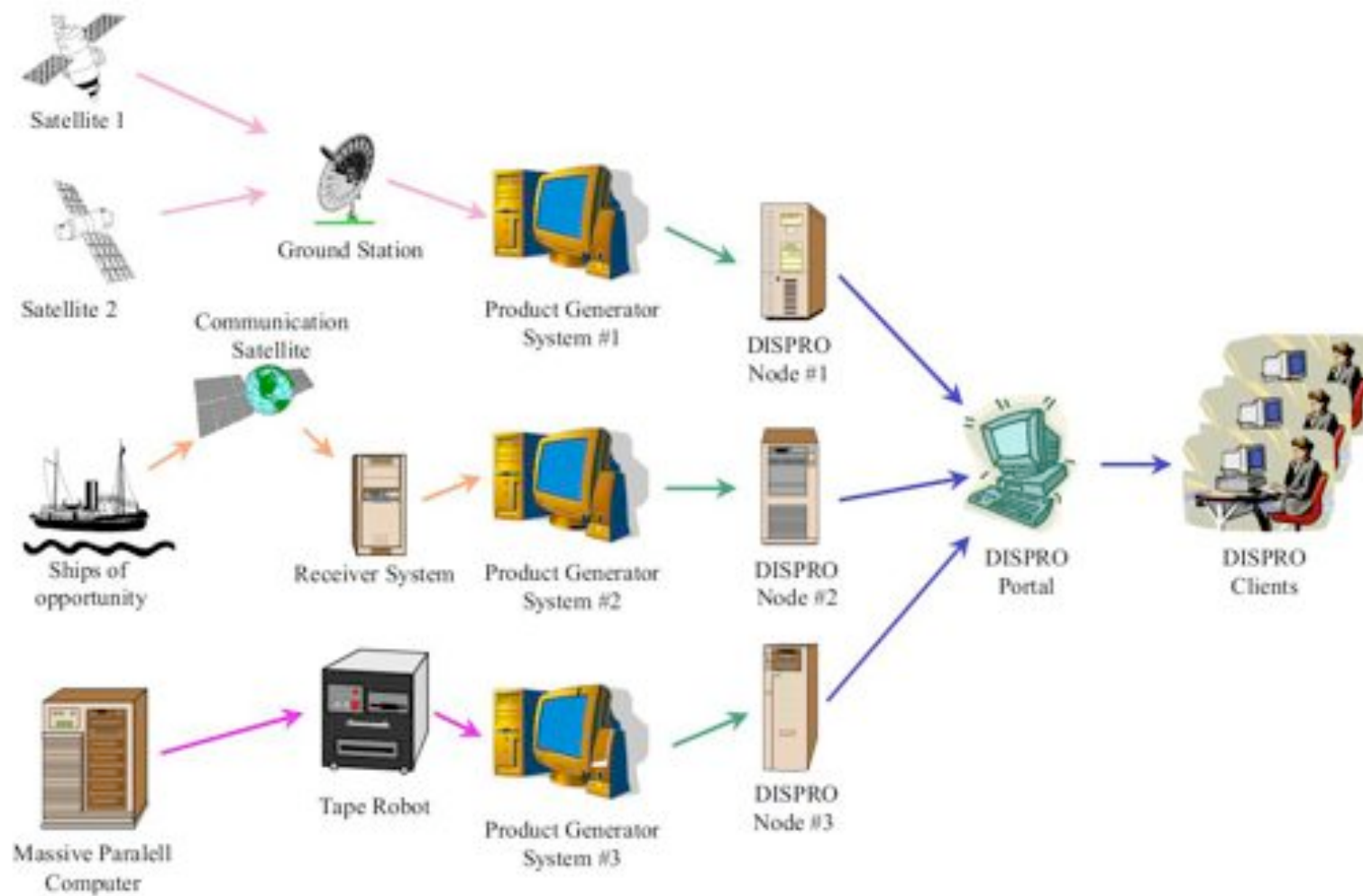
- A user interface presenting remote sensing measurements in the form of raster images
- A distributed system composed of multiple DISPRO nodes which provide measurements
- A catalogue which contains meta information of available measurements



The DISPRO User Interface



DISPRO System Structure

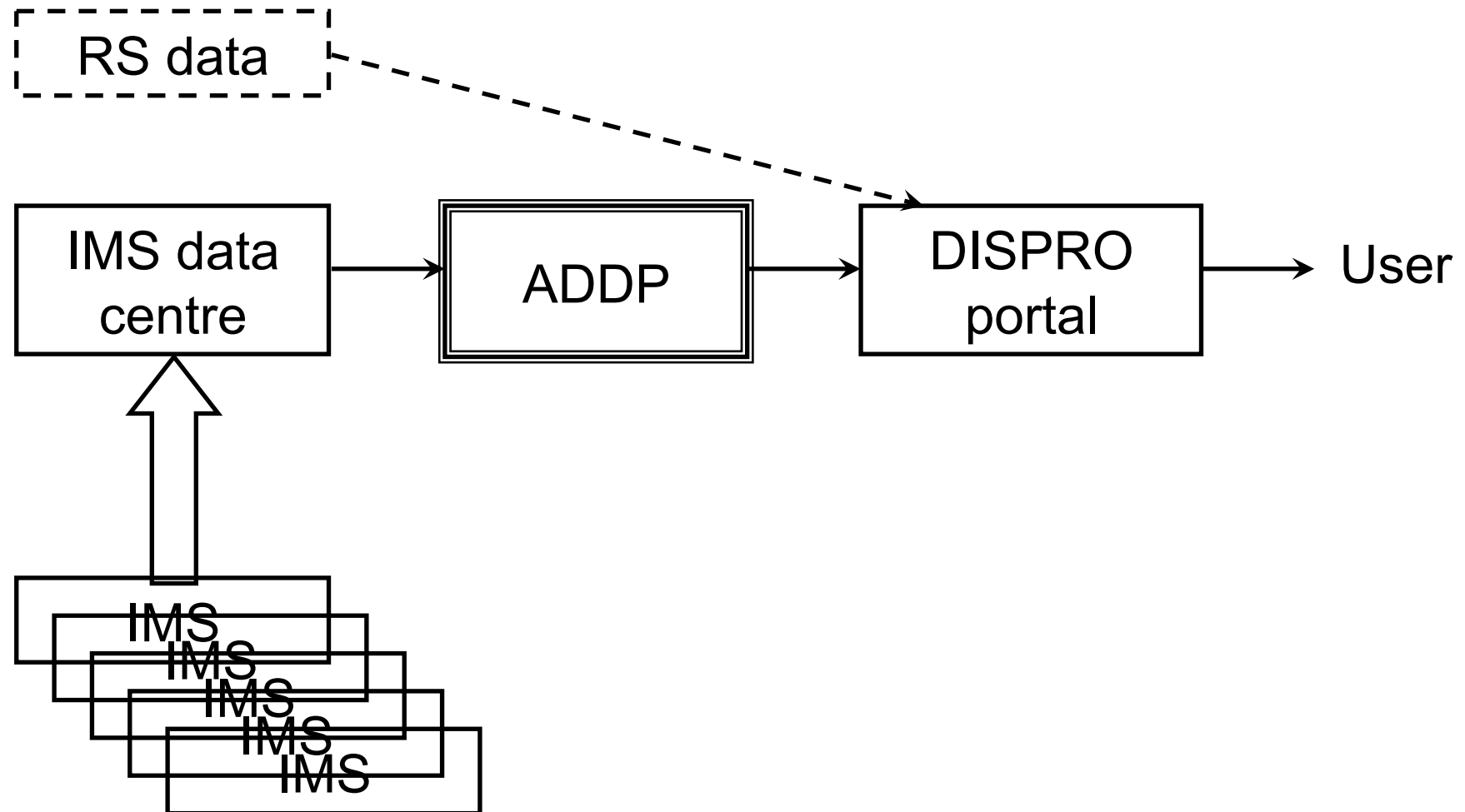


DISPRO Node Properties

- OGC-WMS compatible web map server
- DISPRO specific metadata, in XML format
- A repository of measurement information



Overview of Data Integration and Presentation



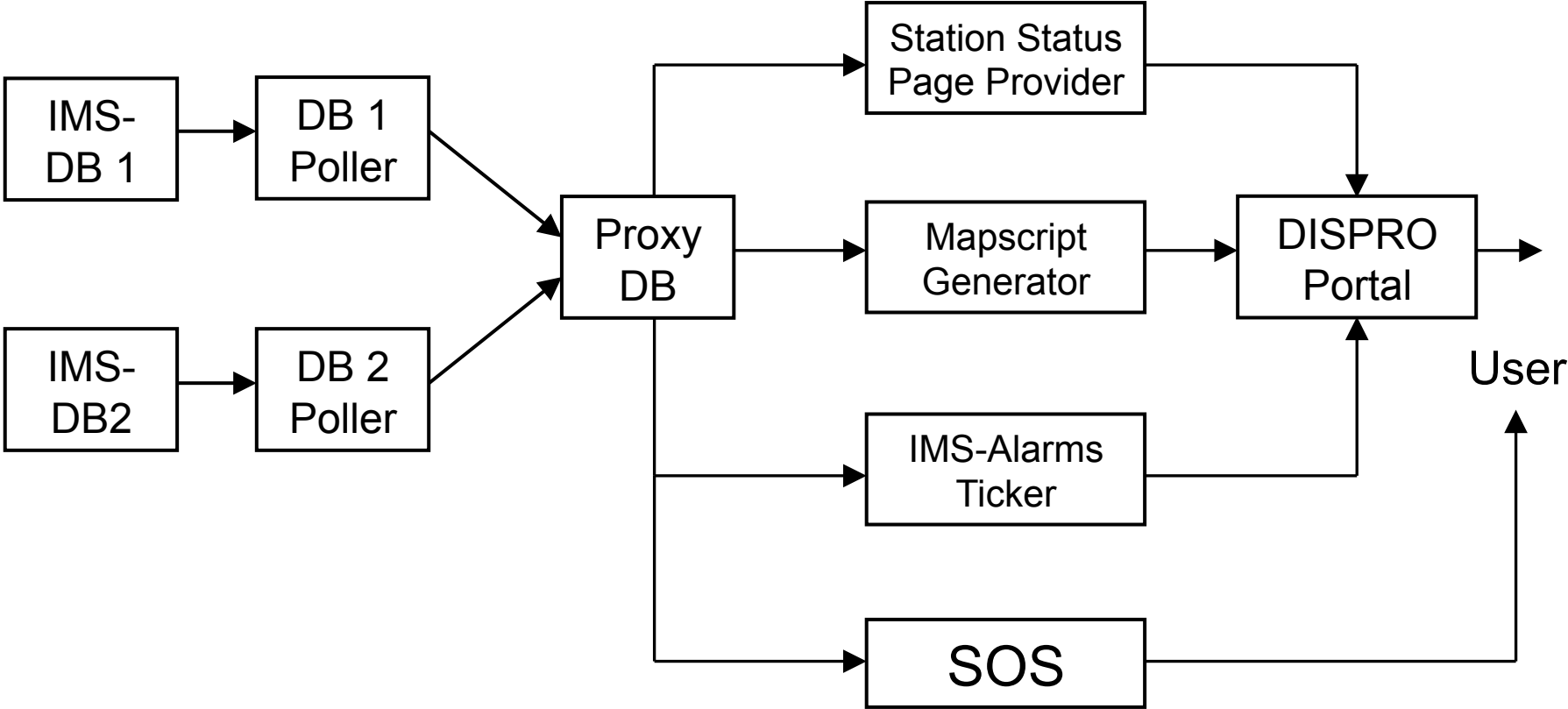
ADDP: Aberdeen DISPRO DB Proxy

A DISPRO-Node with a difference:

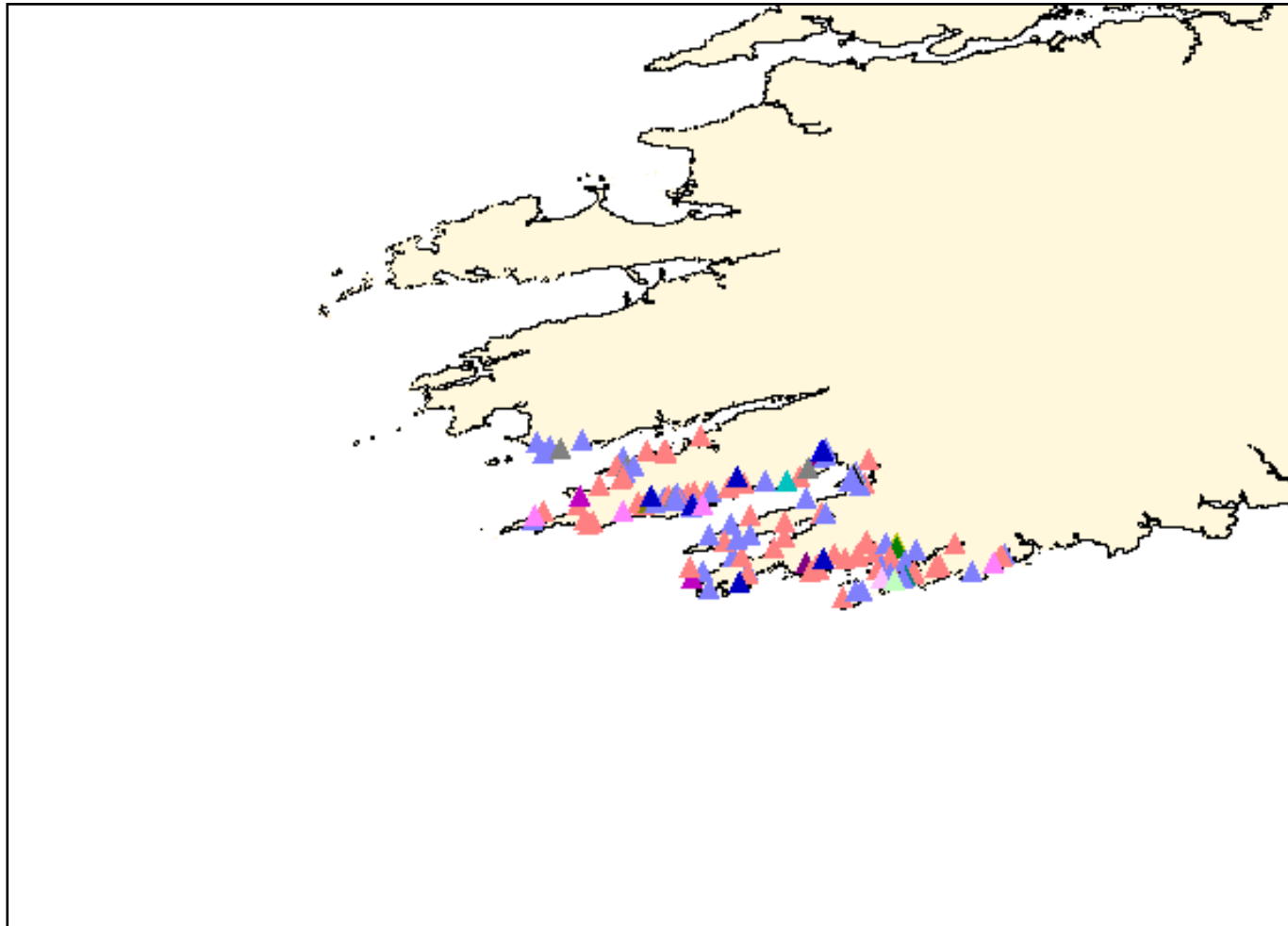
- Able to collect IMS measurements from multiple IMS-DB providers within WARMER (eg. Sysmedia & YSI Hydrodata)
- Stores these measurements locally
 - fast access to the data
 - improve reliability of the system
- Generates DISPRO compatible UMN Mapserver maps, including XML metadata files
- Provides Station Status Pages (SSP)
- Provides information regarding present and past IMS-Alarms to a DISPRO
- Ideal base for future expansions to support OGC-SOS or other services



ADDP dataflow



Possible integration result of in-situ measurements in DISPRO

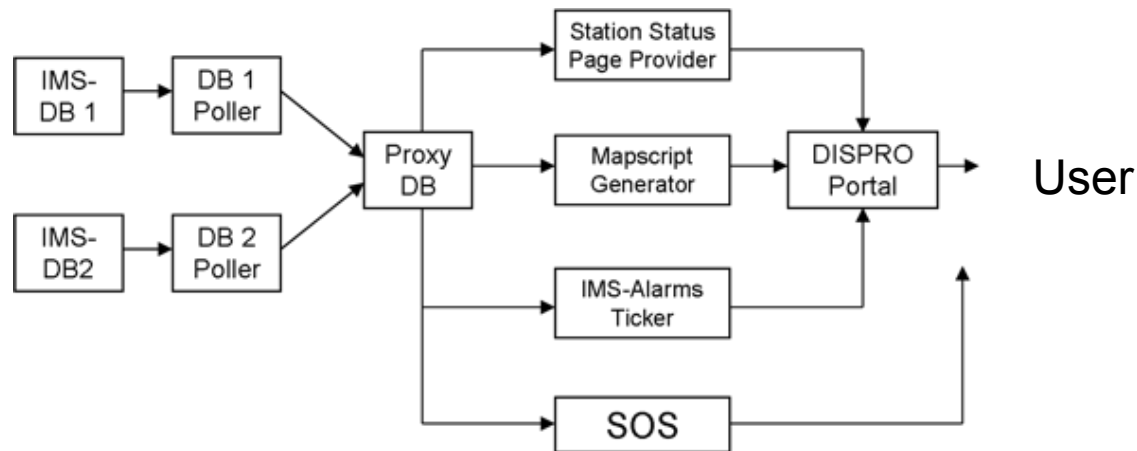


Current status

- Basic features of Proxy-DB available
- Database Poller completed
- Simple Map generation works
- DISPRO XML-Metadata files are generated

Work in progress:

- ADDP not yet incorporated into DISPRO Portal
- Station Status Page Provider under investigation
- No alarm handling capabilities yet



Possible synergies with other sensor web projects

- System compatibility with Sensor Web Enablement services
- Integration of a Decision Support System into the planned Web based software architecture
- Sharing of data



Thank you

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