Scuola universitaria professionale della Svizzera italiana
Dipartimento ambiente costruzioni e design
Istituto scienze della Terra

9th SWISS GEOSCIENCE MEETING 2011 ZURICH

SUPSI

GeoShield project

Managing authentication and permissions to OGC services

Presenting the new GeoServer Resource Access Manager plug-in and the Sensor Observation Service protection

Milan P. Antonovic, Institute of Earth science - SUPSI
Massimiliano Cannata , Institute of Earth science - SUPSI

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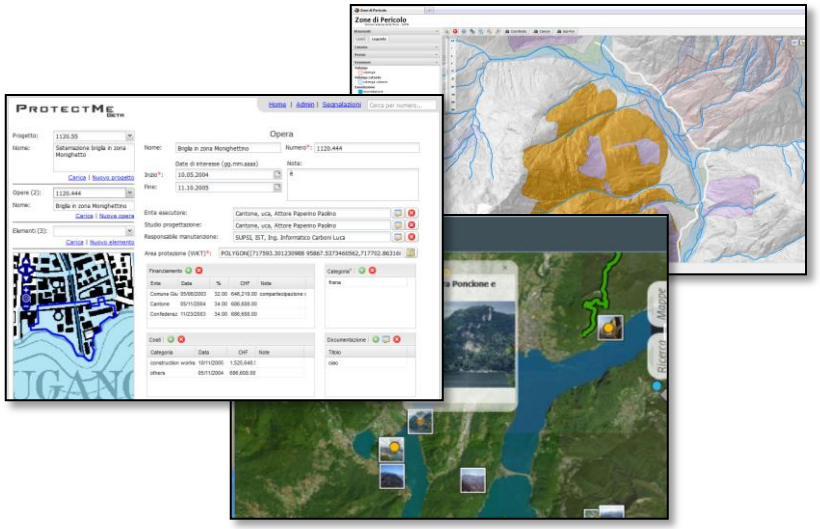
Presentation outline

- Introduction to the Institute of earth science – SUPSI
  - OGC implementations used
  - The need of data protection
- Presenting GeoShield
  - GeoShield's protection strategies
  - Web administration interface
  - OGC Services covered by GeoShield
  - The Sensor Observation Service protection
  - The GeoServer Resource Access Manager plug-in
    - Access rule application process
    - Data access rule application
  - GeoServer Resource Access Manager plug-in demo
  - Next improvements

Introduction to the Institute of earth science – SUPSI

Fields of activity:

- Land Planning
- Hydrogeology
- Hydrology
- Geology
- Geomatics



Focused on:

- Government mandates
  - Geo databases maintenance
  - Web applications for decision making
    - Natural hazard
    - Water protection
    - Wells / Springs / Boreholes
    - Hydrological monitoring network
- Interregional projects (EU, World Bank)
- Training courses
- Research projects

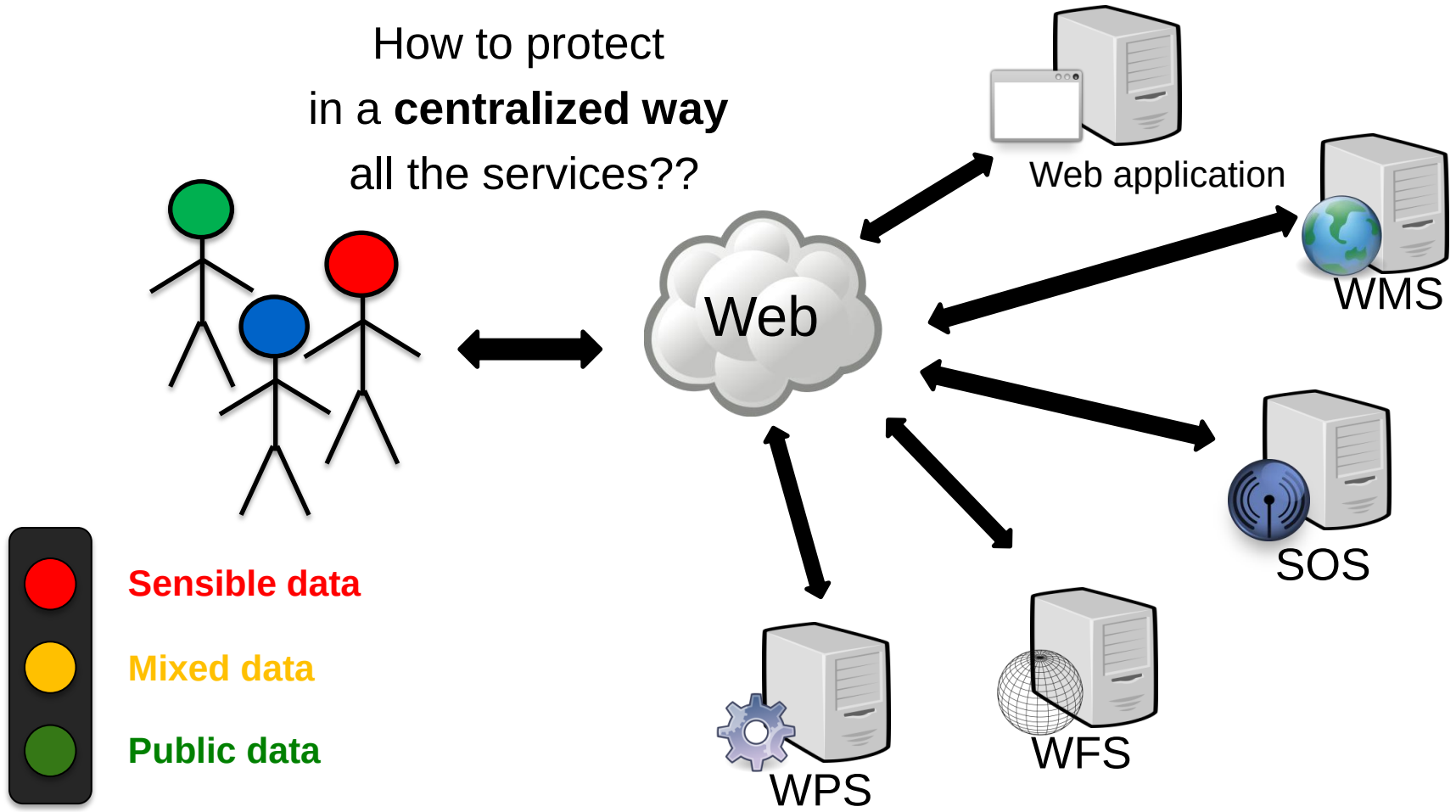
OGC implementations used

Geografical
data serving

Monitoring data

Data **processing** service

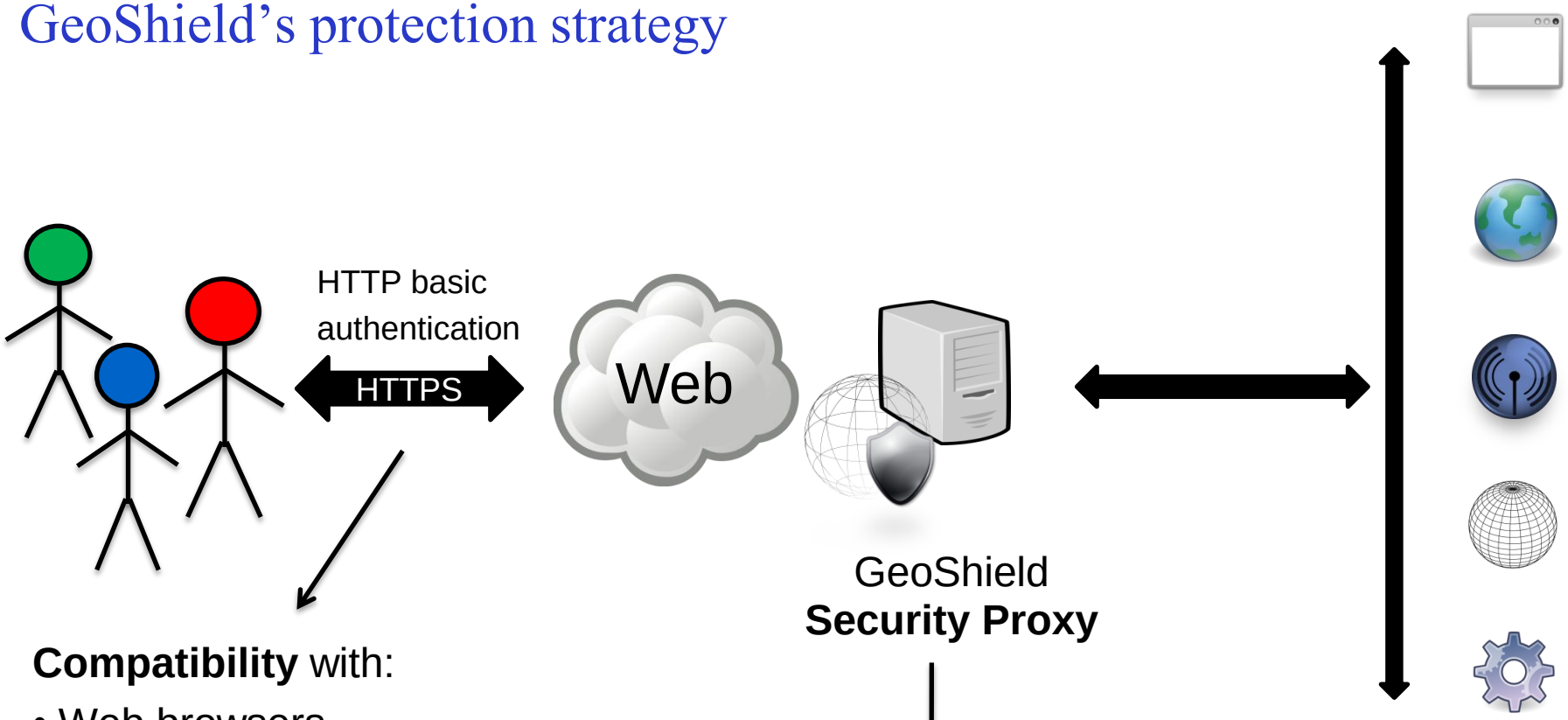
The need of data protection



Presenting GeoShield

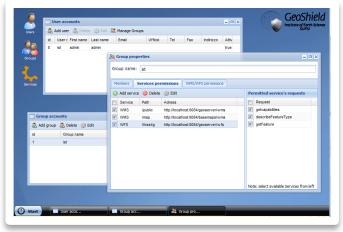
- GeoShield is an Open Source solution for authentication and authorization management to OGC services
- Written in **Java**
- Relies on:
  - Apache Commons
  - GeoTools
  - EclipseLink [Persistence API]
  - PostgreSQL
  - Flexjson (JSON parser)
- Web administration interface
  - Desktop like user interface
  - Sencha - Ext JS
- OGC standards protected
  - WMS
  - WFS
  - SOS
- GeoServer plug-in:
  - Resource Access Manager

GeoShield's protection strategy



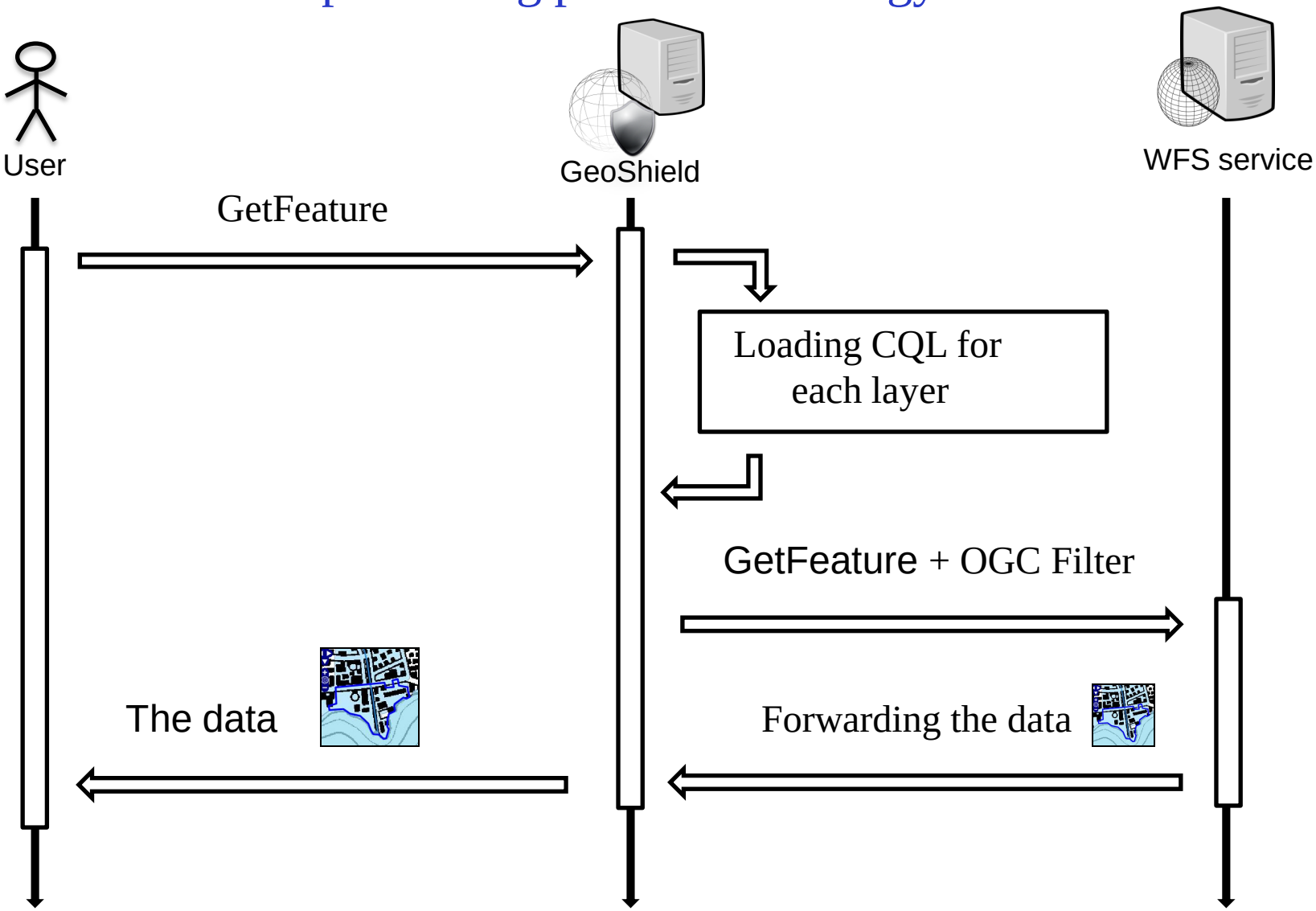
Compatibility with:

- Web browsers
- Desktop applications
  - **Udig, QGIS, ArcGIS**

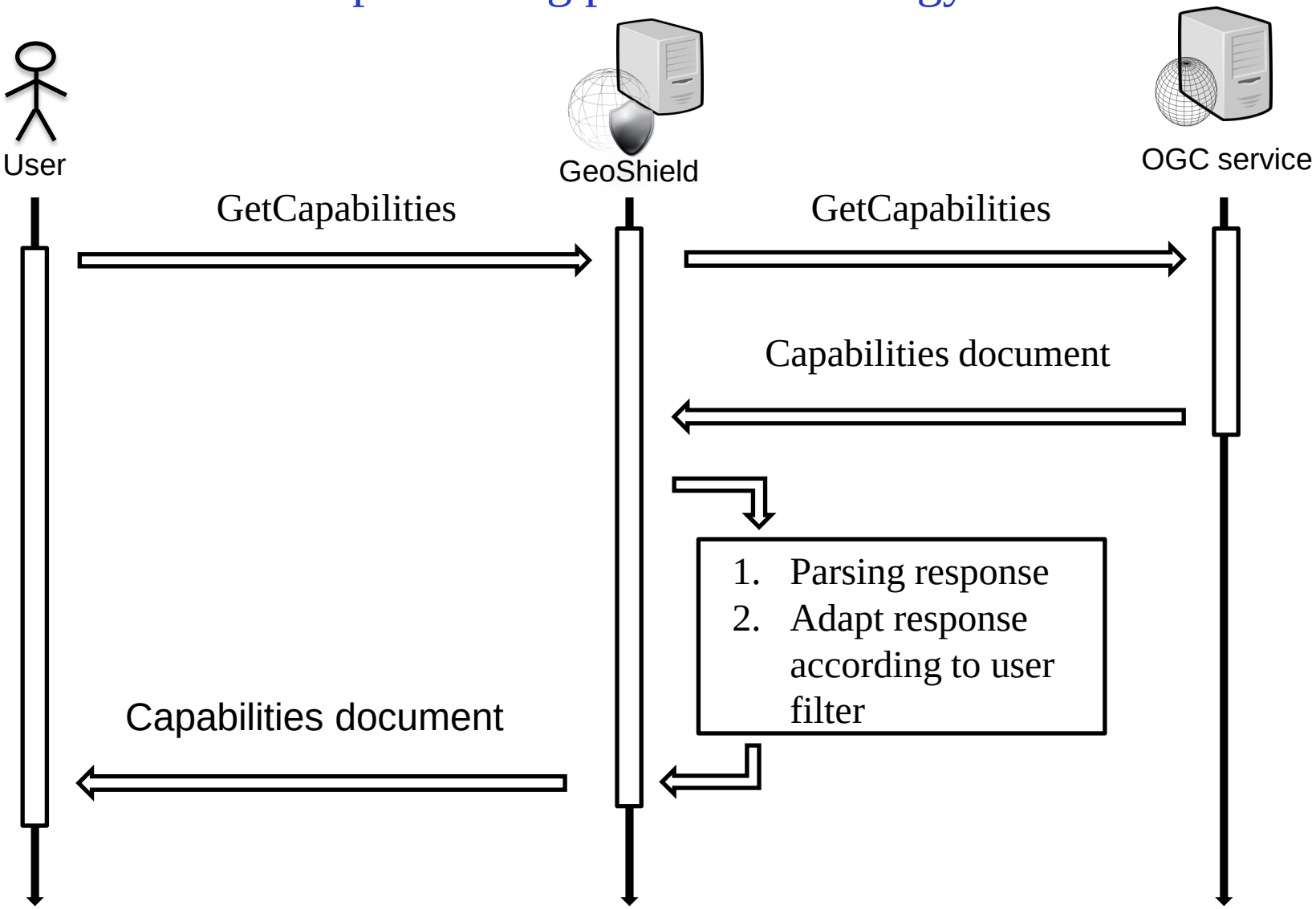


Web administration interface

GeoShield's PRE-processing protection strategy



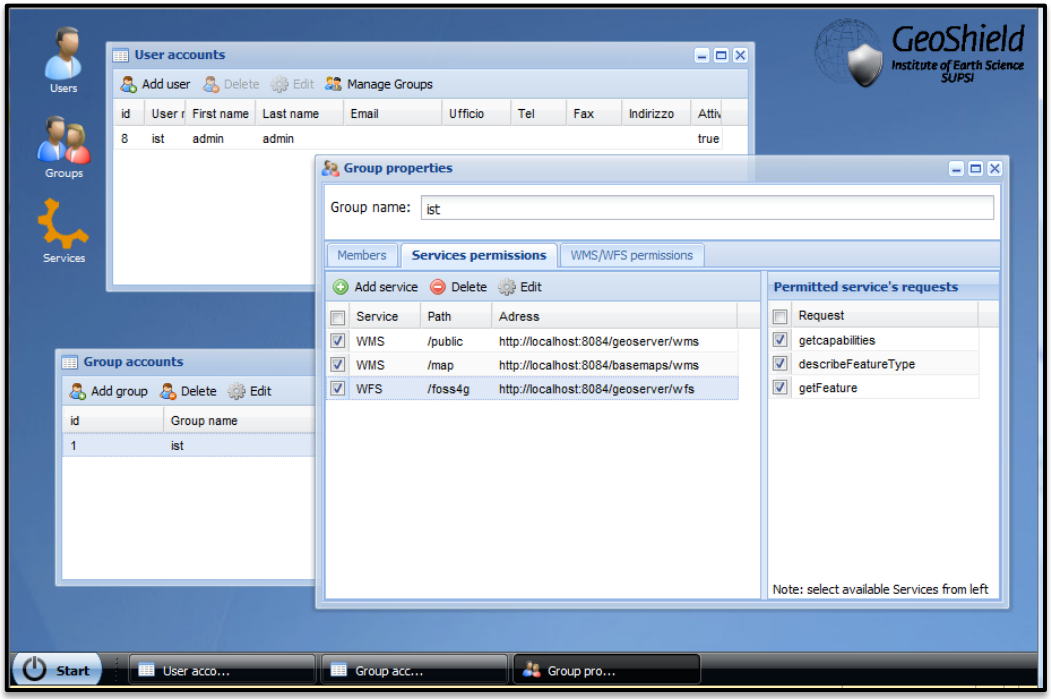
GeoShield's POST-processing protection strategy



Web graphical user interface

- **Password** protected
- User friendly (**Desktop-like** Graphical User Iinterface)

- **Managing authorization** for:
  - Users
  - Groups
  - Services
  - Permissions
  - Permitted requests



OGC Services covered by GeoShield

Web Map Service 1.1.1:

Standard protocol for serving georeferenced map images over the Internet

- **GeoServer** (tested):
  - Filtering capability **CQL** (Common Query Language)
- **Others** (not tested)
  - INCLUDE/EXCLUDE filters only
- Requests:
  - GetCapabilities
  - GetMap
  - GetFeatureInfo
  - GetLegendGraphic

OGC Services covered by GeoShield

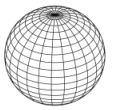
Web Feature Service 1.1.0:

Standard protocol allowing requests for geographical raw data over the Internet

- Permissions definition:
  - Filtering capability **CQL** (Common Query Language)

- Requests (**Basic profile**):
  - GetCapabilities
  - DescribeFeatureType
  - GetFeature

- OutPutFormat: **GML**



OGC Services covered by GeoShield

Sensor Observation Service 1.0.0:

Standard protocol allowing requests for retrieving sensor observation data

- Permissions definition:
  - **Excluding / Including Offerings**

- Requests (**Basic profile**):
  - GetCapabilities
  - GetObservation
  - DescribeSensor

- Response format:
  - text/xml;subtype=**'sensorML/1.0.0'**

The Sensor Observation Service protection

- This is the latest part of GeoShield improvement
- Handle the basic implementation (**core profile**)
- Permissions are based on the **sos:ObservationOffering** grouping of the **sos:Capabilities** document, GeoShield can exclude the access to:
  - Features
  - Procedures
  - ObservedProperties
- **Caching permissions in memory** for better performance

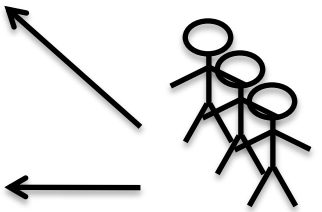
```
<sos:Capabilities>
  [...]
  <sos:Contents>
    <sos:ObservationOfferingList>
      <sos:ObservationOffering gml:id="aaaa">
        <gml:name>urn:x-ist::offering:aaaa</gml:name>
        <gml:boundedBy>[…]</gml:boundedBy>
        <sos:eventTime>[…]</sos:eventTime>
        <sos:procedure xlink:href="B_TRE" />
        <sos:procedure xlink:href="H_TRE" />
        <sos:procedure xlink:href="P_TRE" />
        <sos:procedure xlink:href="T_TRE" />
        <sos:observedProperty xlink:href="urn:ogc:def:property:x-ist::meteo:air:humidity"/>
        <sos:observedProperty xlink:href="urn:ogc:def:property:x-ist::meteo:air:pressure"/>
        <sos:observedProperty xlink:href="urn:ogc:def:property:x-ist::meteo:air:radiation"/>
        <sos:observedProperty xlink:href="urn:ogc:def:property:x-ist::meteo:air:rainfall"/>
        <sos:featureOfInterest xlink:href="urn:ogc:object:feature:x-ist::station:Trevano"/>
      </sos:ObservationOffering>
      <sos:ObservationOffering gml:id="bbbb">
      […]
      </sos:ObservationOffering>
      <sos:responseFormat>text/xml;subtype='sensorML/1.0.0'</sos:responseFormat>
      <sos:responseMode>inline</sos:responseMode>
      <sos:resultModel>om:Observation</sos:resultModel>
    </sos:ObservationOfferingList>
  </sos:Contents>
</sos:Capabilities>
```

GeoShield's Sensor Observation Service protection strategy

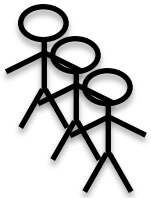
ObservationOffering 1:
- Sensor 1
- Sensor 2

ObservationOffering 2:
- Sensor 3
- **Sensor 4 (private)**
- Sensor 5

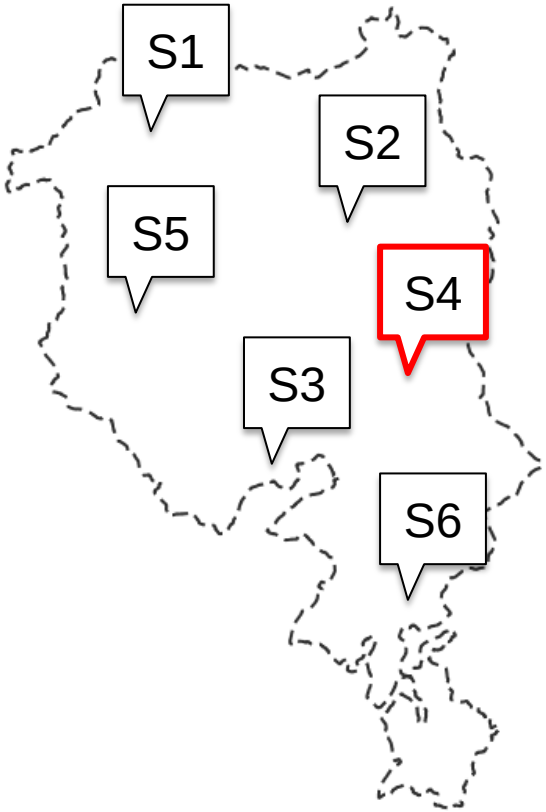
ObservationOffering 3:
- Sensor 1
- Sensor 2
- Sensor 5
- Sensor 6



Group 1



Group 2

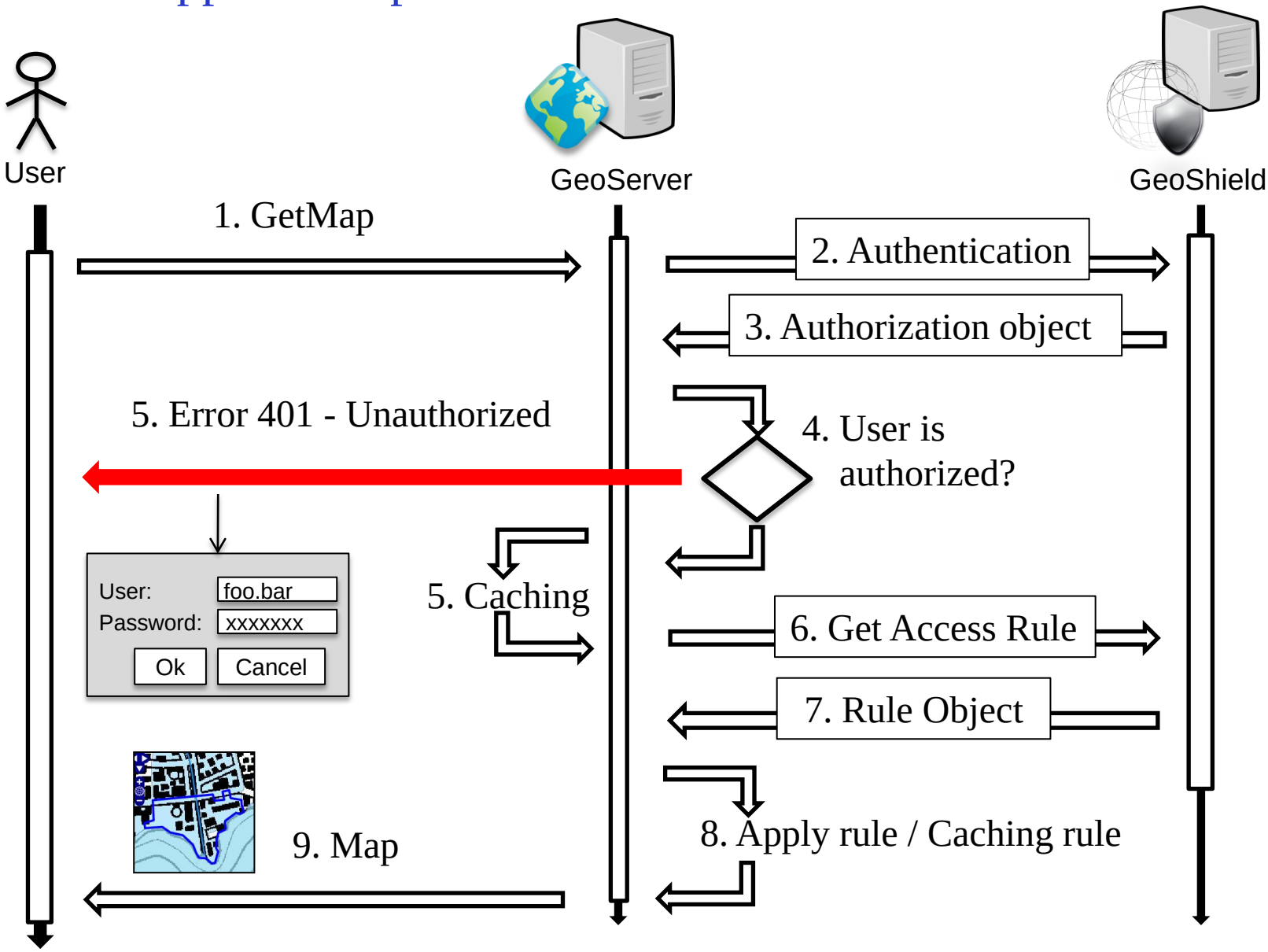


GeoServer Resource Access Manager plug-in

- This year, **GeoServer 2.1** version has introduced support for data filtering with an improved security framework:
  - The main feature is the availability to extend the internal **Resource Access Manager** with a plug-in

- Benefits:
  - **No more limited permission** (yes/no definition) for each layer
  - Extended capabilities to implement **granular data access rules**
    - Filters based on geographical functions (BBOX, INTERSETC…)
    - Filters based on attributes
    - Include / Exclude filters
    - Workspace permissions
  - Integration with **external users database**
  - **More reliable and stronger protection** at data abstraction level

Access rule application process



Benchmarking WMS GetMap

- Tests are going to be run using JMeter on my Workstation:
  - Ubuntu 10.04, Intel Core Duo 2.4 GHz E4600, 4Gb RAM
- Using a progression of 1, 2, 4, 8, 16 and 32 threads, each thread group doing 100, 200, 200, 400, 400, 800 requests respectively
- Layer: topp:tasmania_water_bodies

threads/requests	1/100	2/200	4/200	8/400	16/400
GeoServer*	79	71	79	102	316
GeoShield (PROXY)	291	315	653	3346	7837
GeoServer (PLUGIN)	134	151	190	332	1320

* without authentication

Installing the plug-in

When GeoServer and GeoShield are installed, adding the Resource Access Manager plug-in is quite simple:

1. Copy the **geoshield-1.0.jar** file into the GeoServer's WEB-INF/lib directory
2. Modify the web.xml file adding a Filter definition
3. Create the **GEOSHIELD_USER**
4. Configure the permissions on GeoShield

GeoServer Resource Access Manager plug-in

Demo

Next improvements

- Extending security:
  - Web Processing Service
  - Web Applications

- Web administration interface
  - Integration with GeoServer Web Interface
  - OpenLayers integration (Real Time Permission definition and test)

- Release of the GeoShield stable version 1.0 (end of 2011)
  - Code refactoring
  - Better performance

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Thank you

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Institute of Earth science
http://www.ist.supsi.ch

GeoShield project
http://sites.google.com/site/geoshieldproject

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