

# Unosat Grid Project

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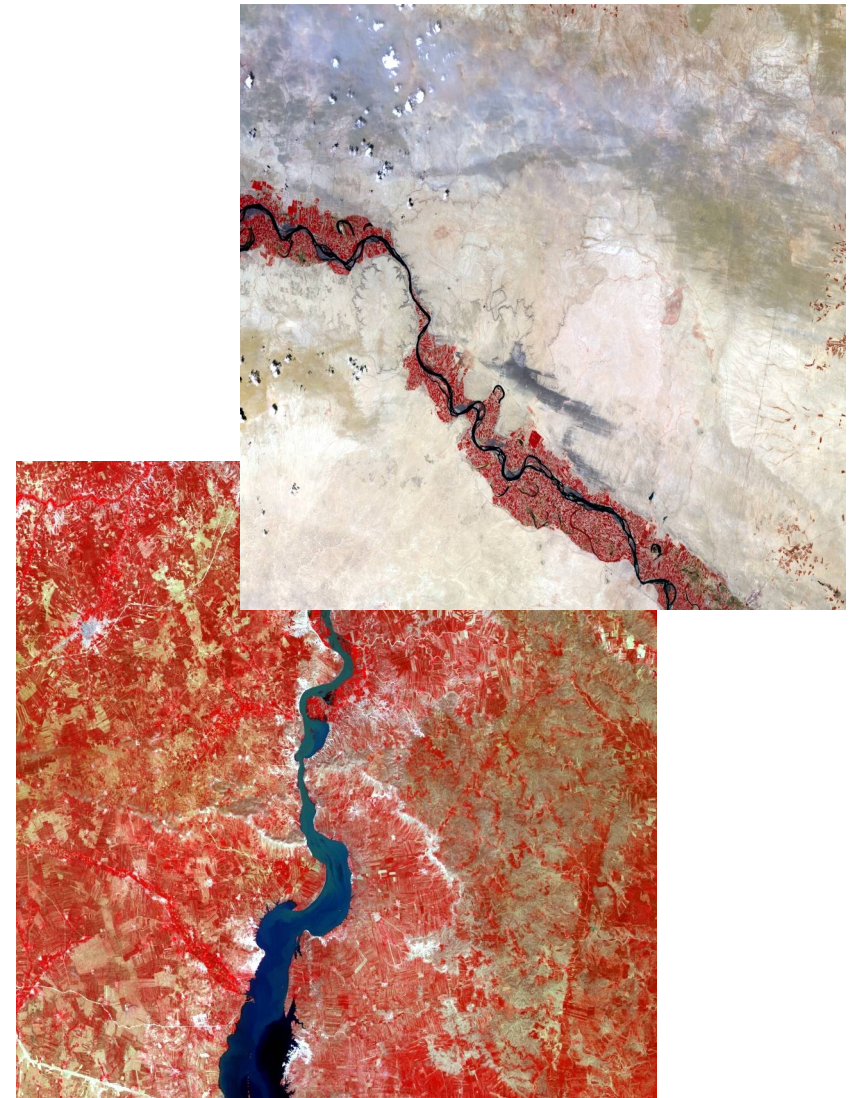
- **Introduction**
  - Unosat and the Unosat GRID Project
  - Architecture
  - GRID Side : Data management evolution
- **User Side : Demonstrations**
  - Web portal
    - *Presented by Prof. Olivier Ertz*
  - Mobile application
- **Conclusion**

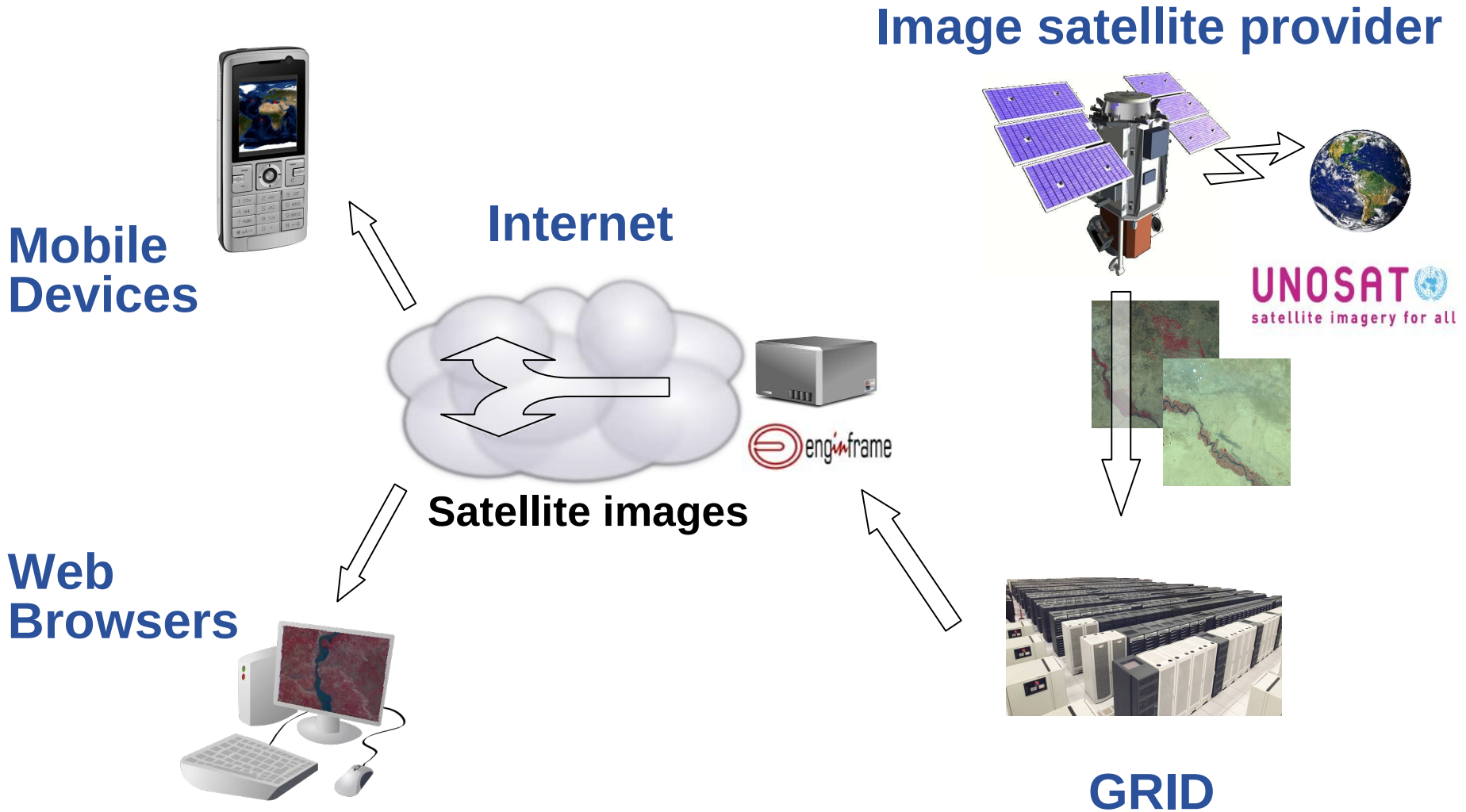




- Unosat concept devised in 2000
- Unosat is created and hosted at CERN in 2002
- First interaction with the GRID in 2003
  - Unosat gridcafé demo is created by summer students
- Beginning of the “Unosat Grid Project” in 2005
  - Unosat's Tsunami data moved into the GRID by summer students
  - First infrastructure created
- Continued in 2006
  - Study of the gridification of Unosat data by a master student
  - Leading to the architecture and to prototypes
- Continued since 2007
  - Evolution to the current state by research assistants

- **Unosat satellite Imagery**
  - ~ 1000 satellites images
  - Size from 200 MB to 1 GB
  - Associated metadata
- **Grid**
  - Storing the images
  - Processing the images
- **Clients**
  - Dynamic and fast access to the images

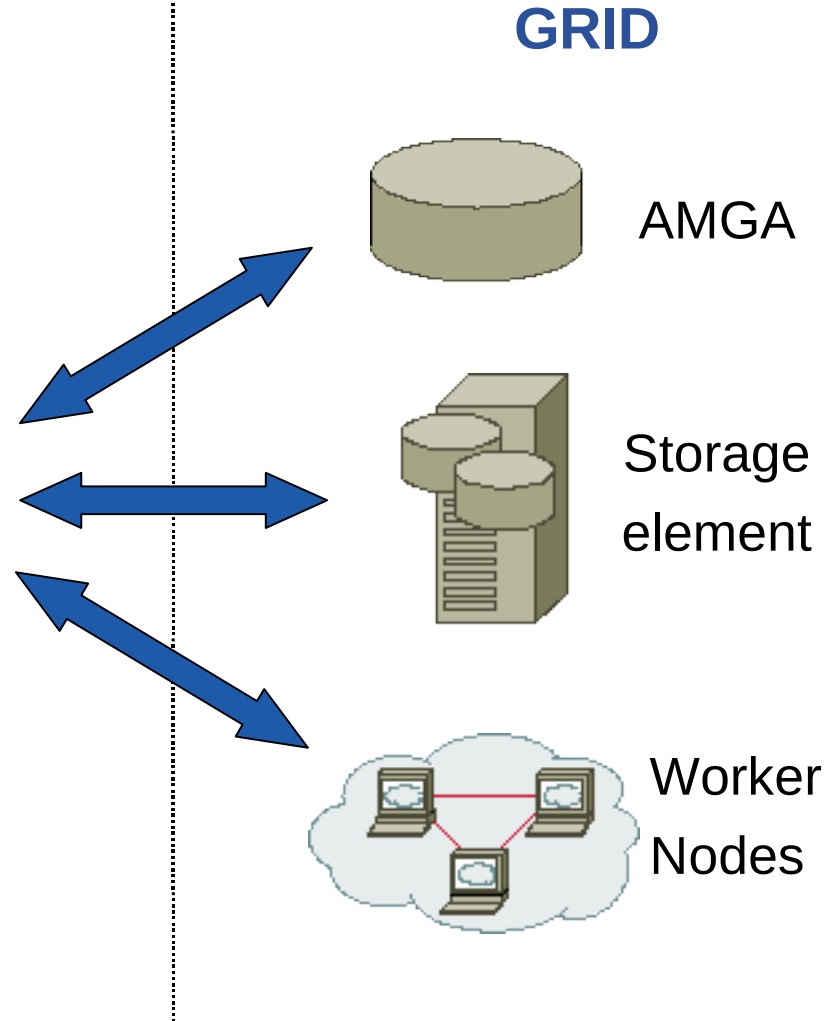




## Portal



## GRID





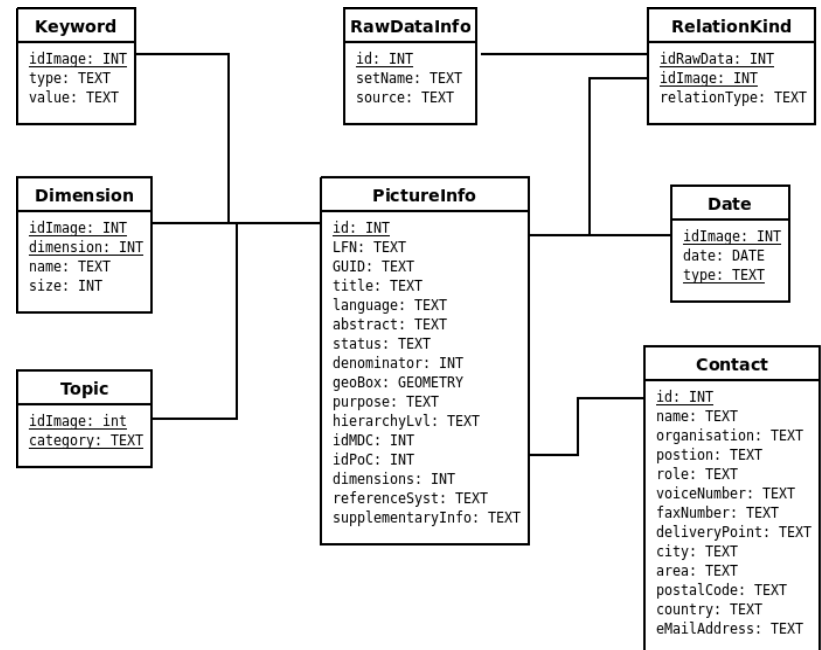
- **Metadata**
  - “Data about Data”
  - Informations describing the content of a file
- **Metadata Catalogue**
  - System that reference a set of similar files using metadata
- **AMGA**
  - Metadata Catalogue created for the GRID by the ARDA team
  - Available in the GRID middleware since gLite 1.5
  - Used in various GRID Projects (BioMed, LHCb, Atlas,...)
  - Offer to the administrator
    - Choice of the back-end database (Oracle, Postgresql, etc.)
    - Security methods (certificate, ACL, etc.)
    - GRID adapted (Replicas, distribution, etc.)

- Reference the content of the satellite images
  - Title, Country, Place
  - Dates (Creation, Insertion)
  - Position
- Back-End used
  - Postgresql & PostGIS
  - Enable geospatial query
- Created for the GRID
  - Available in gLite
  - Security
  - Reliability

```

<idPurp>Rapid mapping in case of natural hazard</idPurp>
<status>
  <ProgCd value="onGoing"/>
</status>
</status>
<idPoC>
  <rpIndName>Einar Bjorgo</rpIndName>
  <rpOrgName>UNOSAT</rpOrgName>
  <rpPosName>Head of Unit</rpPosName>
  <rpCntInfo>
    <cntPhone>
      <voiceNum>0041764874998</voiceNum>
      <faxNum/>
    </cntPhone>
    <cntAddress>
      <delPoint>CERN Meyrin</delPoint>
      <city>GENEVA</city>
      <adminArea>Geneva</adminArea>
      <postCode>1211 Geneva 23</postCode>
      <country>Switzerland</country>
      <eMailAdd>info@unosat.org</eMailAdd>
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  </rpCntInfo>
  <role>
    <RoleCd value="custodian"/>
  </role>
</idPoC>
<resConst>
  <LegConsts>
    <accessConsts>
      <RestrictCd value="copyright"/>
    </accessConsts>
  </LegConsts>
</resConst>

```





- **Grid portal developed by Nice srl.**
  - Based on XML, Java, HTML, etc.
- **Hide the GRID complexity to the user**
  - Offer an easy to use interface
  - Simple and quick authentication
  - Manage the jobs
  - Retrieve and store the jobs results
- **Serve as gateway between the applications and the GRID**
  - Web Service : access to services stored on a remote server from clients using the web as communication canal

- **Insertion**

- Store the raw image into a storage element
- Store the metadata referencing the image in AMGA

- **Access**

- Provide a coordinate and a radius
- Send a job to the GRID
  - Select an image containing the coordinate using AMGA
  - Retrieve the raw image corresponding to the coordinate
  - Crop this image in function of the coordinate and the radius
- Get the result

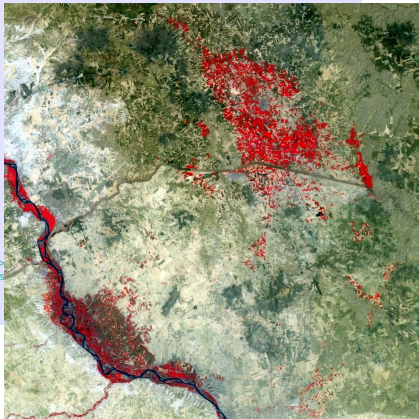
- **Problems**

- Impossible to choose the image
- Important delay between the request and the result

```

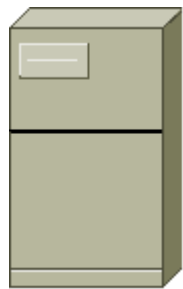
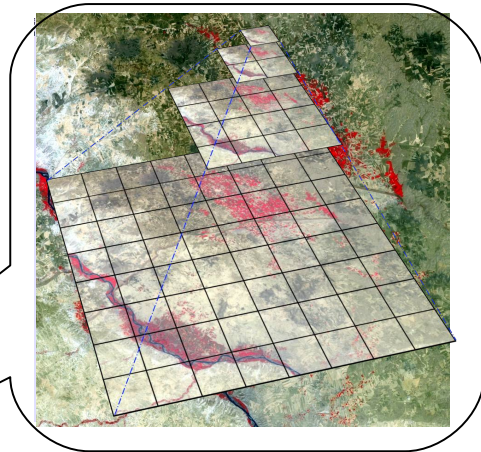
<idPurp>Rapid mapping in case of natural hazard</idPurp>
<status>
  <ProgCd value="onGoing"/>
</status>
<idPoC>
  <rpIndName>Einar Bjorgo</rpIndName>
</idPoC>
  <resCons>

```

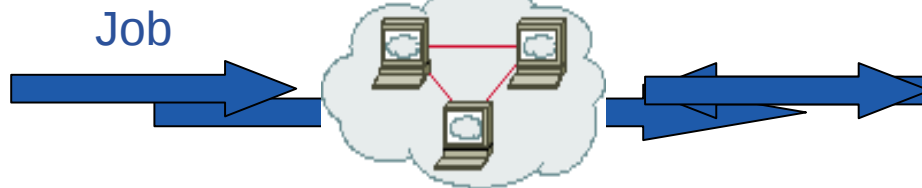


- Metadata File
- Raw Image

Multiresolution Pyramid



EnginFrame Portal



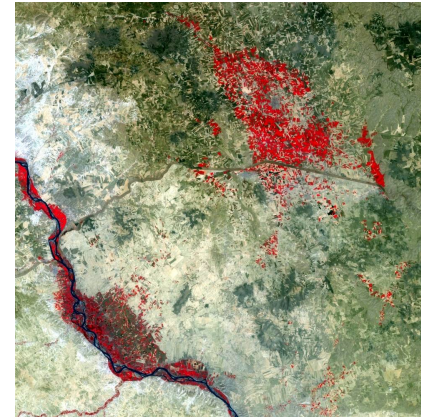
Worker Nodes



Storage Element  
Metadata Catalog

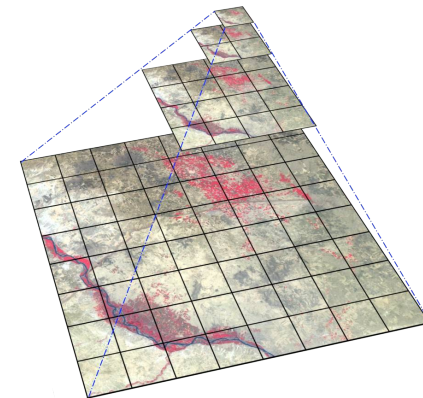
- **Raw File**

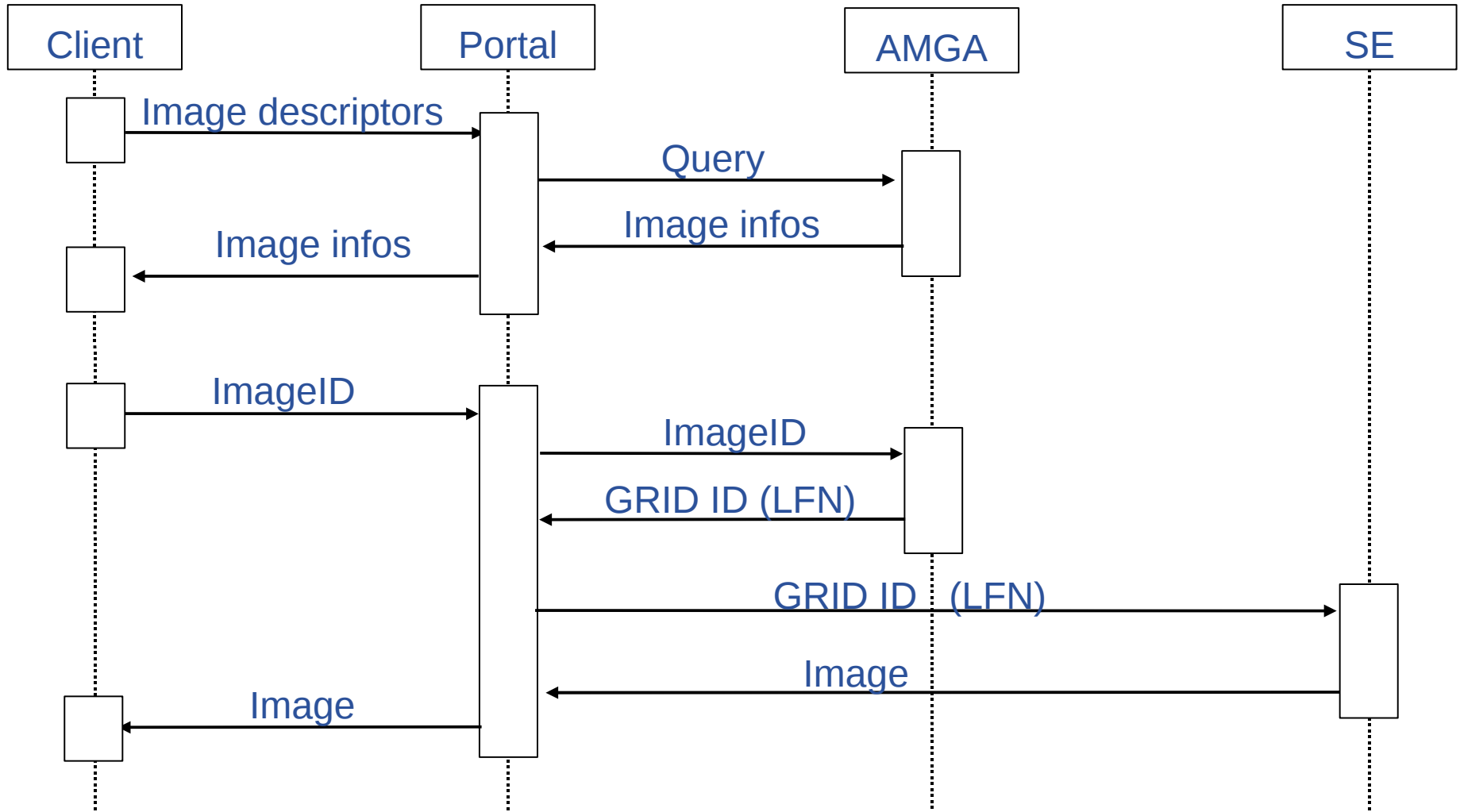
- 1 image
- Full quality
- Big size (~ 200MB - 1GB)
- Access : need to be processed



- **Multi-Resolution Pyramid Image**

- Lot of small images (tiles)
- Compressed (75% quality)
- Small size
  - 3-6% the size of the raw image
- Access : **direct**

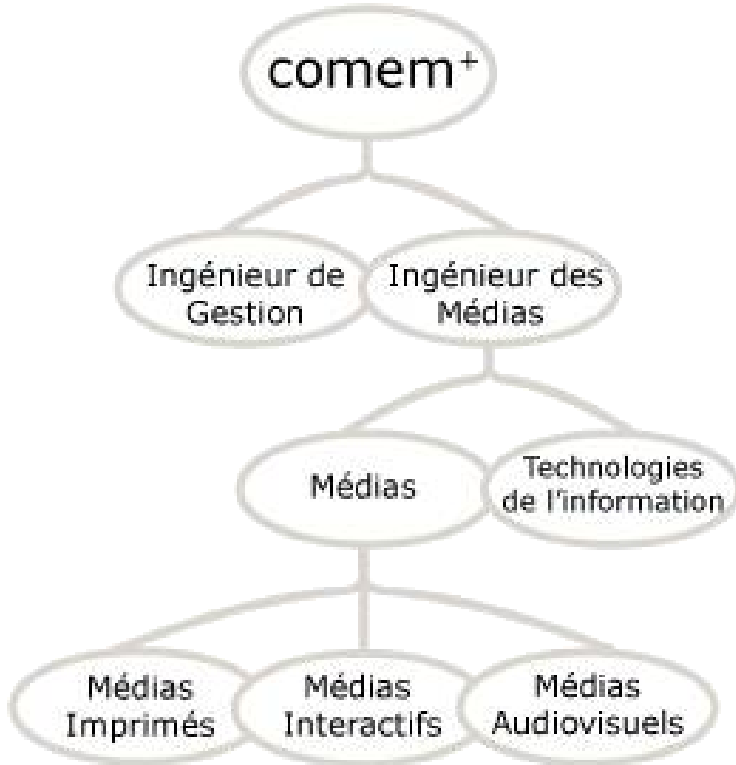




- **Get connected to EnginFrame web portal**
- **Select the insertion service**
- **Select the metadata file and the satellite image**
- **Ask EnginFrame to submit the job**
- **Monitor the current state of your Job**



- Introduction and GRID Side
- **User Side : Demonstrations**
  - Web portal
    - *Presented by Prof. Olivier Ertz*
  - Mobile application
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# comem+

COMmunication + Engineering + Management



Yverdon-les-Bains

- **Research field** : towards democratization of GIS through open webmapping technologies and open standards
- **Main focuses** :
  - Web Thematic mapping (representation of abstract elements)
  - Interoperability through open standards (W3C, OGC specs)
  - Quality of map rendering (open source map rendering engines)
- **Some projects** :
  - Mediamaps : a forerunner testbed of web thematic mapping representations using vector format Scalable Vector Graphics
  - GoWS : an extension proposal for Symbology Encoding specification dedicated to thematic representations
  - PAL : development of meta-heuristic algorithms for intelligent placement of labels; integration in a GIS desktop (gvSIG); on-demand labeling service based on Web Processing Service

More informations on <http://www.iict.ch> - <http://geosysin.iict.ch>

- **Why a webmapping client ?**
- **Purpose : give the user a way to find satellite images by exploring the database of images on a world map**
  - Search metadata given
    - Satellite type
    - Geographic region
    - Time period
  - Mapping :
    - View results :
      - *bounding-box of each image*
      - *in a list*
    - View details by :
      - *selection on the map (+ auto select in list)*
      - *selection in the list (+ auto zoom on map)*
    - Usual zoom/pan controls

**Dabagrid Demo**

Connected user : unosat  
 LogOut **LOGIN FORM**

Quick location:  
 Africa  
 Somalia  
 Select a city...

**MAP CONTROLS**  
**MAP**  
 Ethiopia  
 Djibouti  
 Ethiopia  
 Somalia  
 Uganda  
 Kenya  
 Somalia  
 Kenya  
 Uganda  
 Kenya  
 Sudan  
 Rep. of Congo

**PROPERTIES**  
 Info Box  
 version : null  
 data  
 title : SPOT4\_k150\_j349\_4\_20061122\_XI\_L2A\_20m  
 date : 2006-11-22  
 dateType : null  
 abstract : Spot satellite image of k150-j349 in Somalia  
 purpose : Rapid mapping in case of natural hazards  
 status : null  
 keywords  
 scale : 50000  
 language : null  
 charset : null  
 topicCategory : imageryBaseMapsEarthCover  
 supplementaryInformation : Scene ID 4150349061  
 scope : dataset  
 refSystem : UTM44, WGS 1984

**REQUEST FORM**  
 Form Layer  
 Lon min : 30.752838134765  
 Lat min : -4.625682651994  
 Lon max : 61.646392822261  
 Lat max : 14.92998141050  
 Satellites  
 Spot:   
 Ikonos:   
 Landsat:   
 Quickbird:   
 All:   
 Start Date : 2001-07-21  
 End Date : 2010-01-01  
 Load Dates

**IMAGE**  
 Layer Tree  
 Autozoom Show Hide

**LIST OF RESULTS**

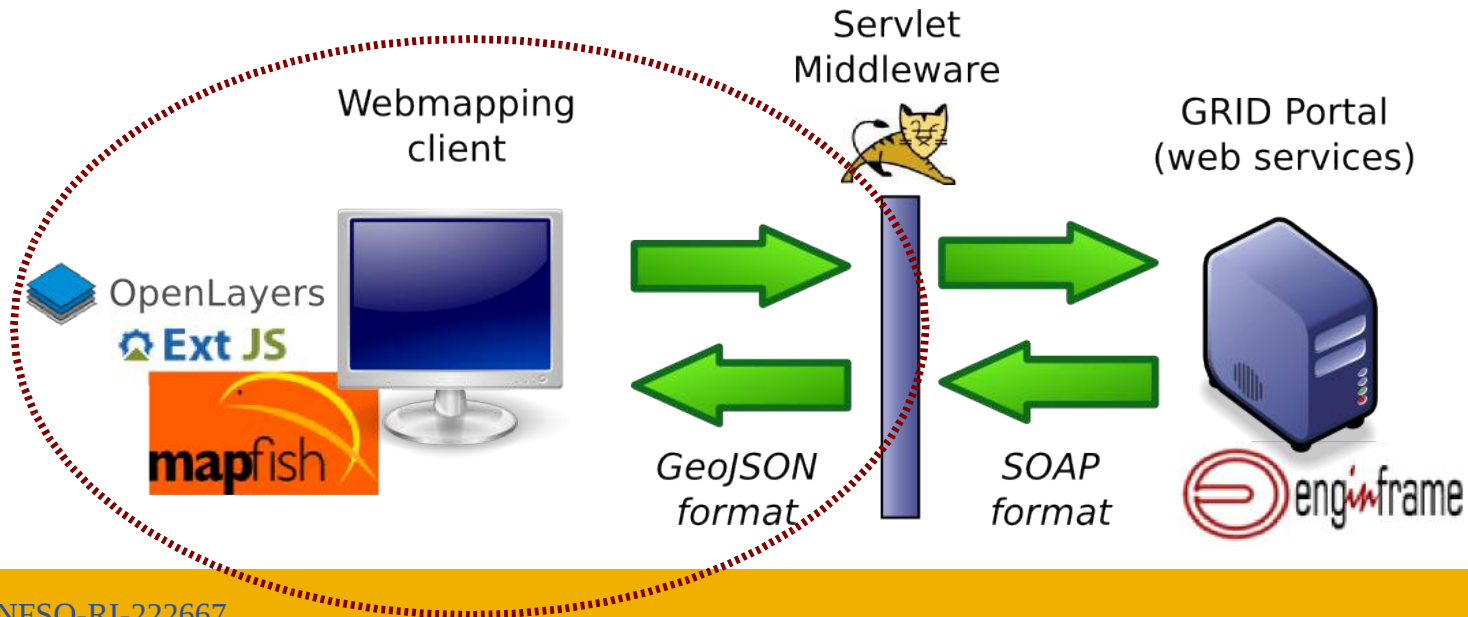
✓	33	po_230366_0000000_Sablaale_2003_12_06	Somalia
✓	34	po_230367_0000000_Sabuun_2006_01_29	Somalia
✓	37	QuickBird_balcad_20070309_PMI_L2A	Somalia
✓	38	QuickBird_hawaay_20050709_PMI_L2A	Somalia
✓	39	SPOT4_k150_j349_4_20061122_XI_L2A_20m	k150-j349
✓	40	SPOT4_k153_j346_8_20060609_XI_L2A_20m	k153-j346
✓	41	SPOT4_k153_j346_8_20061117_XI_L2A_20m	k153-j346
✓	42	SPOT4_k153_j346_8_20061120_XI_L2A_20m	k153-j346
✓	43	SPOT4_k154_j344_4_20061203_PAN_L2A_10m	k154-j344



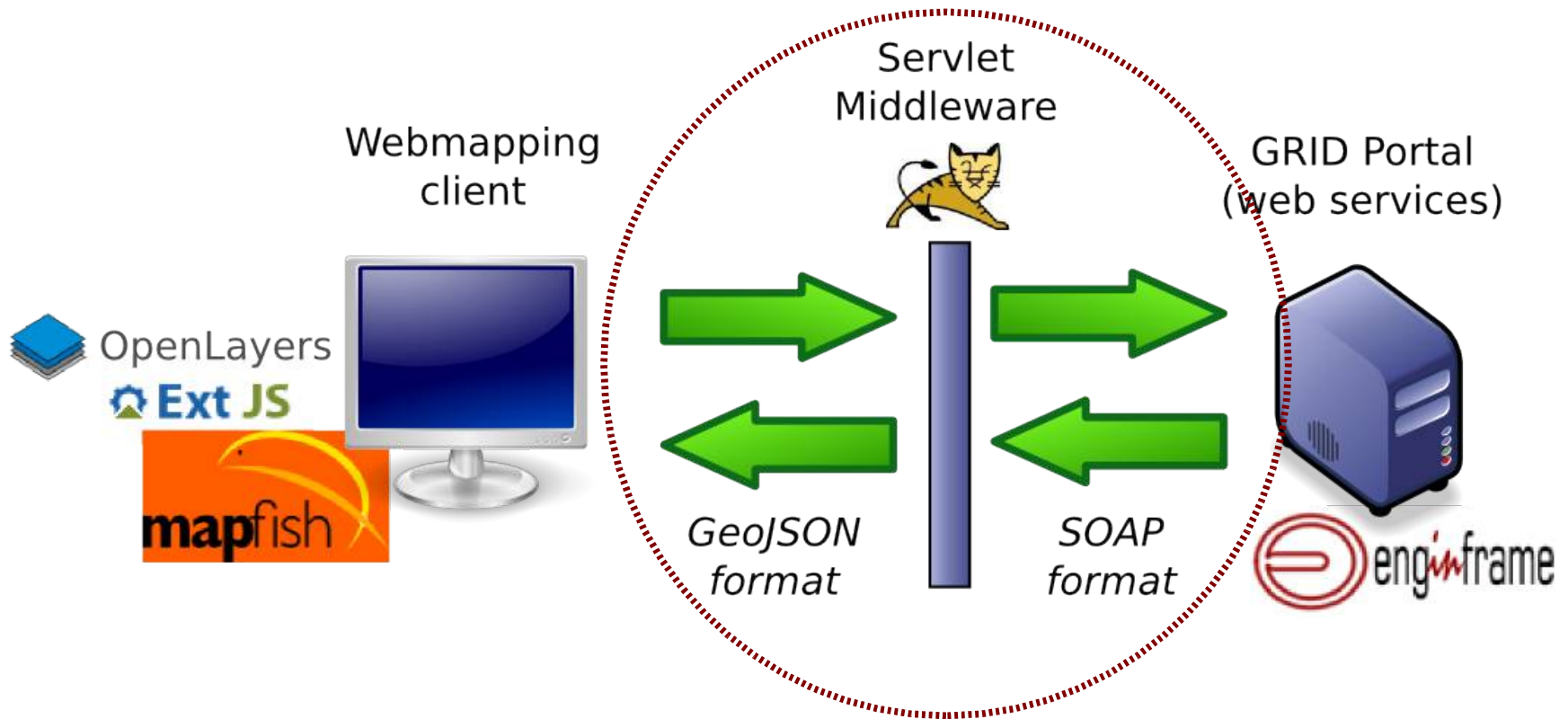
[http://carto.iict.ch/www/mapfish/projects/dabagrid\\_final](http://carto.iict.ch/www/mapfish/projects/dabagrid_final)



- **Client-side : using AJAX webmapping technologies**
  - MapFish framework = OpenLayers + ExtJS frameworks
    - OpenLayers : provide and manage mapping elements
    - ExtJS : provide and manage “desktop-like” user interface widgets
  - Benefits :
    - Rich user experience through a web browser
    - Based on Javascript, cross-browser (IE, FF, Safari, ...)
    - Open source and open standards (OGC, GeoJSON, ...)



- **Server-side middleware :**
  - a wrapper to communicate with Enginframe web services
    - to translate SOAP request from JSON format encoding
    - to translate SOAP response to GeoJSON format encoding





- **Different map layers of reference :**
  - Raster from Nasa (Blue Marble), or Google Maps, ...
  - Vector and names : cities, rivers, ...
  
- **Get image :**
  - Get a thumbnail image
  - Get a GeoTIFF for GIS desktop
  
- **Improve user interface :**
  - Distinguish images by satellite :
    - On the map : symbolization = fillColor rule per satellite
    - In the list : filter/sort data grid result by satellite names, ...
    - ...



- Introduction and GRID Side
- **User Side : Demonstrations**
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- **Designed for field workers**
- **Running**
  - on mobile phone
  - on J2ME enabled Smart Phone and PDA (with internet connection)
- **Optimized to preserve the resources of the device**
  - Image caching
  - Connected only when needed



- **Identification by EnginFrame**
- **Search methods :**
  - Image descriptors
  - Web mapping services
  - GPS
- **Metadata browsing**
  - List of results in a preview list
  - Selected item in details
- **Image view :**
  - The thumbnail of the image
  - The tiles of the images

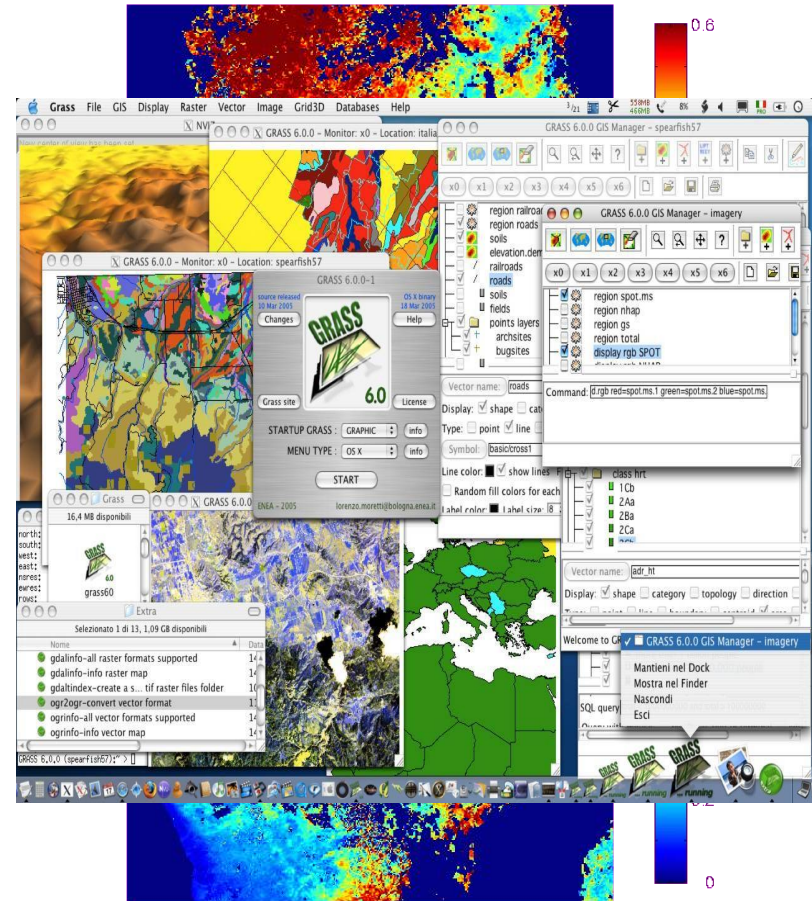


- **External GPS bluetooth**
- **Currently doesn't work for SmartPhone with internal GPS**
- **Search mode**
  - GPS Quick Search
    - Return the latest image for this GPS coordinate if existing
  - GPS Normal Search
    - Return the whole list of images for this GPS coordinate

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- **Whole project**
  - Already functional
  - Require some fix / optimisation
- **GRID side**
  - Optimisation of the data insertion
- **Applications**
  - Web portal
    - View and Preview of an image
  - Mobile phone
    - Sending a mail containing the web portal URL of an image

- **GRASS**
  - Geographic resources Analysis Support System
  - Open source GIS
- **Process**
  - Different Vegetation Index
  - Temporal DVI
  - Unsupervised classification
  - Etc.





- **We would like to thank**
  - Unosat
  - CERN
  - Nice
  - EIG
  - UNIGE
  - HEIG-VD
  - INFN catania

*End of the presentation*

*Any questions ?*