

# gvSIG Mobile as mobile client of SDI

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## Abstract

The effort that the introduction and development of a Spatial Data Infrastructure (SDI) requires would be meaningless without the existence of desktop and mobile applications that allow the users to access to the SDI data.

gvSIG as an open-source desktop GIS SDI client could not cover the needs of all those mobile users who have to work with GIS tools in surveying activities, so it was decided to port gvSIG desktop to a variety of mobile devices under the name of gvSIG Mobile project.

gvSIG Mobile was developed in J2ME and in the present day has two prototypes released under the GNU/GPL license, that offer several functionalities such as vector and raster support, layer management, query tools, WMS access, GPS enablement, viewer capabilities, integration with gvSIG desktop, basic edition, Sun PhoneME Advanced open-source Java Virtual Machine support, editing tools through custom forms, GML and KML support, GPS enhancements, etc.

gvSIG Mobile works under PDAs, smartphones, cell phones and its use is planned in Tablet PCs.

gvSIG Mobile has become a well known GIS mobile client of a SDI and its application will be very useful in sectors such as Urban Planning, Land Management, Infrastructures Management, Prevention and Detection of forest fires, etc.

**Keywords:** gvSIG, gvSIG Mobile, open-source, SDI, JAVA ME, GNU/GPL, WMS, Sun PhoneME, GPS, GML, KML, J2ME CDC, JVM, PDA

## 1. THE ORIGIN OF gvSIG Mobile

gvSIG<sup>1</sup> started as a first open source Geographic Information System of the Regional Ministry of Infrastructures and Transport of Valencia region (Spain) within a full migration from proprietary to open-source software. It was released under the GNU/GPL license.

gvSIG desktop is a GIS SDI client that improves its capabilities continuously to allow a full use of open-source GIS, without needing proprietary software. Therefore, it integrates with other FOSS4G<sup>2</sup> products such as geospatial databases, remote web servers, catalog servers, and so on.

At the time that gvSIG desktop and other open-source solutions for web clients and for different kind of servers were established in the Ministry, a variety of GIS users were detected. At that point, it was observed that there was no open-source solution to address the requirements of

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<sup>1</sup> <https://gvSIG.org/>

<sup>2</sup> <http://2009.fooss4g.org/>

GIS mobile users. To reach this goal it was decided to port gvSIG desktop to a variety of mobile devices such as PDAs, smartphones, cell phones, etc, so that the total migration from closed software to open source solutions could be achieved. The project, known as gvSIG Mobile<sup>3</sup> has two prototypes released under the GNU/GPL license.

## **2. THE FIRST PROTOTYPE: gvSIG Mobile 0.1**

### **2.1 Objectives**

gvSIG desktop was developed in JAVA and in order to benefit from its knowledge and experience, it was decided to build up a JAVA GIS application for mobile devices.

For that goal the first prototype of gvSIG Mobile was used as a test-bed for validating the working of Java GIS applications on mobile devices. The conclusions of this development proved the feasibility of the Java Micro Edition platform for this kind of applications. The next step was to make a full refactoring of gvSIG Mobile with the aim of making the source code and architecture of both applications as compatible as possible.

gvSIG Mobile was developed in J2ME<sup>4</sup> and the Java multiplatform feature allowed to gvSIG Mobile to work on any device with Java Virtual Machines. The first prototype worked with IBM J9 and supported the following platforms: Windows Mobile 5.0/6.0., Windows Pocket PC 200X., Linux/ARM, pdaXrom, PDA Sharp Zaurus, Windows/x86, Linux/x86.

This first prototype was developed by Prodevelop S.L and the Robotics Institute of the Polytechnic University of Valencia.

### **2.2 Functions**

The first prototype of gvSIG Mobile presented an attractive and easy user interface with a basic set of functions such viewer capabilities or project management functionality that allows the setting up of the defaults properties of the project and view: SRS system, language, path, etc.

Data such as vector data (shapefiles), raster data (ECW, JPEG, and PNG) can be added. The access to OGC<sup>5</sup> services such as WMS<sup>6</sup> is also possible and this capability converts this prototype into a client of a Spatial Data Infrastructure.

The Layer Management function allows to change the symbology and general properties of the layers.

Through the query data function, objects selections or selections by attribute can be carried out. Therefore measurements of distances, areas and coordinates can be obtained.

The GPS Navigation functionality permits the configuration of the GPS device, the showing of the information about the satellite constellation and signal parameters, the generation of tracklogs and waypoints, the simulation of a GPS device, etc.

In order to connect gvSIG desktop with gvSIG Mobile a new extension to export

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<sup>3</sup> <https://gvsig.org/web/projects/gvsig-mobile>

<sup>4</sup> <http://java.sun.com/javame/overview/why.jsp>

<sup>5</sup> <http://www.opengeospatial.org/>

<sup>6</sup> <http://www.opengeospatial.org/standards/wms>

cartographic information from gvSIG desktop to the PDA was developed<sup>7</sup>.

This first prototype was released in April of 2007 and from this moment gvSIG Mobile became a well known GIS mobile client of a SDI. For example the technicians could access to the data relating to the Spanish Property Register “in situ” via WMS<sup>8</sup> or to the PNOA (Aerial Ortophoto National Plan of Aerial Ortophotography) via WMS<sup>9</sup>.

### 3. THE SECOND PROTOTYPE: gvSIG Mobile 0.2

#### 3.1 Objectives

One of the main goals of this prototype was the Phone ME<sup>10</sup> open-source Java Virtual Machine support, that is compatible with the J9 Virtual Machine of IBM. It has been worked on very closely with Davy Preuveneers, who developed the JVM CDC with Personal Profile.

In order to satisfy one of the well known demands of GIS mobile users, to capture geospatial data “in situ”, the implementation of a basic editing tool of graphic and alphanumeric data using GPS through custom forms was carried out.

On the other hand, the support of GML<sup>11</sup>, GPX<sup>12</sup> and KML<sup>13</sup> formats was also developed to increase the interoperability of gvSIG Mobile.

As well as the first prototype, this second prototype supports the following platforms: Windows Mobile 5.0/6.0., Windows Pocket PC 200X., Linux/ARM, pdaXrom, PDA Sharp Zaurus, Windows/x86, Linux/x8.

New compatibilities with other platforms will be added such as Android<sup>14</sup> from Google and also more limited versions for J2ME CLDC in common mobile devices.

This second prototype was developed by *Prodevelop S.L* and *IVER Tecnologías de la Información, S.A.* and was released under the GNU/GPL license in March of 2009.

#### 3.2 Functions

This prototype allows the editing of graphic data, using or not GPS data, and the editing of alphanumeric data through custom forms. These custom forms are based on Thinlet<sup>15</sup>, that it is a GUI toolkit that translates the XML file showing it with an specific design .

New formats are available and it is possible to export vectorial data into GML, GPX and KML formats. The GPX format used for the tracklogs can be read direct from gvSIG desktop.

Therefore a new GPS function has been developed in order to set an endpoint of a route , to show the whole route and to calculate the distance between the first and the endpoint.

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7 <http://www.gvsig.gva.es/index.php?id=extensindesincron&L=2>

8 <http://ovc.catastro.meh.es/Cartografia/WMS/ServidorWMS.aspx>

9 <http://www.idee.es/wms/PNOA/PNOA>

10 <https://phoneme.dev.java.net/>

11 <http://www.opengeospatial.org/standards/gml>

12 <http://www.topografix.com/gpx.asp>

13 <http://www.opengeospatial.org/standards/kml>

14 <http://www.youtube.com/watch?v=qvbFifhQ11g>

15 <http://www.thinlet.com/index.html>

## 4. ROAD MAP: gvSIG Mobile in the future

The roadmap of the project contains new functions that will convert gvSIG Mobile into one of the most well known open-source mobile GIS client of SDI. These functions among others are:

- Support of extra vector formats such as DGN and DWG,...
- Support of extra raster formats such as GeoTIFF and MrSID
- Integration with OpenStreetMap<sup>16</sup>
- Support for the direct connection with external Geodatabases such as PostGIS<sup>17</sup>, Oracle and MySQL
- Support for the access to standard services: ECWP or ArcIMS
- Support for the access to new OGC protocols (WFS, WFS-T)
- New GNSS support (DGPS and NTRIP)
- Navigation support: POIs and Alerts
- Sensor function (SOS service) within the framework of the Sensor Web Enablement Initiative (SWE)<sup>18</sup>
- Geosynchronization via WFS-T<sup>19</sup>
- Advanced symbology
- Advance editing, etc.

## 5. CONCLUSION

gvSIG Mobile as a GIS mobile client of a SDI is a powerful tool for professional sectors in which the editing of data "in situ" is very important.

Through gvSIG Mobile the connection to data from a SDI, the edition of existing data or the capture of new data by means of custom forms pre-designed in the office can be carried out "in situ" and in real time, allowing the technicians to speed up the tasks involved in the managing of the territorial data.

gvSIG Mobile it is an useful tool for sectors such as Urban Planning, Land Management, Infrastructures Management, Prevention and Detection of forest fires, Management Disasters, Tourism, etc

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<sup>16</sup> <http://www.openstreetmap.org/>

<sup>17</sup> <http://postgis.refractory.net/>

<sup>18</sup> <http://www.opengeospatial.org/projects/groups/sensorweb>

<sup>19</sup> <http://www.opengeospatial.org/standards/wfs>

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