

Building business applications above gvSIG

*A case study with a bus network management GIS for the Algerian
Transport Minister*

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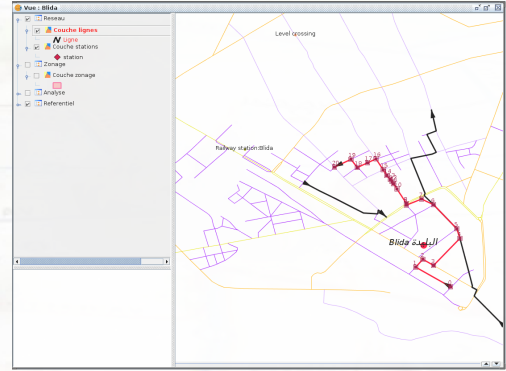
On the programme...

- **Backgrounds...**
- **Why gvSIG ?**
- **Developing with gvSIG : feedback**
- **Overview of the *SIG Transport* application**







Backgrounds



Origins of the project

- **Project for the setting-up and the modernization of transport network in Algeria**
 - On the Algerian Transport Minister's initiative 
 - Contract with the Belgian consulting company 
- **Need for a first tool to map and study the bus networks**
 - Subcontract with the company Alkante



The needs

- **GIS functionalities...**

- Mapping

- Bus network

- Cities base map (scanned map, road networks...)

- Bus Network update

- Drawing bus lines and bus stops

- Map printing (pdf)

- Making simple analysis in order qualify the socio-economic impact of the network

- **...for non GIS experts**



The *SIG-Transport* Application



Network creation
and update
module

NavTable
Extension

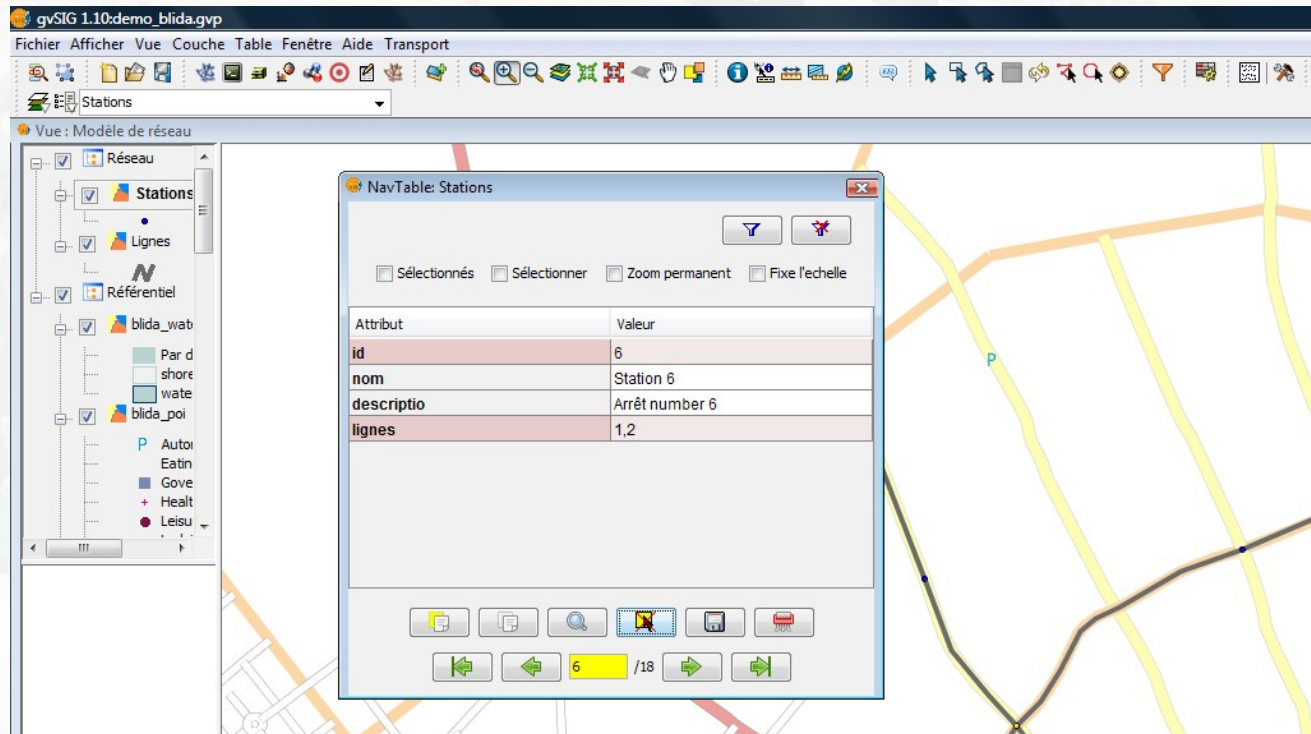


Network
Socio-economic
impact analysis
module



Network creation/update Module

- **Drawing bus lines and bus stops**
 - Bus stops are linked to lines and *vice-versa*
 - Snapping on road network and on already drawn bus network



Network analysis module

- Estimating the impact of network fragments on socio-economic areas
 - Economic areas (populated areas) as an input layer
 - Based on a radius (r_i) defined around bus lines/stops
 - Impact is defined as a area ratio

$$Tx(R, Z) = \text{area}(\text{buffer}(R, r_i) \cap Z) / \text{area}(Z)$$

id_zone	population	area	area_b	ratio	populat_tx
1.0	1000.0	1109065.62...	98475.14188	0.08879	88.79

0 / 1 Total registres sélectionnés.



Currently...

- **First user training in May 2011. Next user training next week (December 2011)**
- **Application installed in 13 Algerian cities and already used in real conditions**
- **Waiting for user comments (coming next week...)**





Why gvSIG ?



Several reasons...

- **An adaptable GIS that fulfils the needs...**
 - Raster and vector data sources
 - Edition tools to create and update network
 - Advanced spatial analysis (Sextante)
 - Thematic mapping
 - Printing and export (pdf, paper printing)



Several reasons...

- **Freeware**

- Client point of view : No initial cost for a GIS which has not been specialized and no extra cost for license

- **Open source (GNU GPL)**

- Alkante point of view : guaranty the ability to develop business specific modules and to adapt the graphical user interface

- **JAVA (cross-platform)**

- One development compatible with Linux and Windows (XP, Vista, 7...)



Several reasons...

- **French translation of gvSIG available**
- **GvSIG : Mature and alive project**
 - Maturity (6 years)
 - Users community
 - Several plugins coming from various contributors



A user friendly GIS but...

- **Some adjustments necessary for non gis specialists**
 - Making editing and drawing toolbar simpler
 - Displaying attribute data in a form rather than in a table (*à la* navTable)
 - Making network analysis as automatic as possible



Editing toolbar simplified

- Less geometric edition tools



- Vertices edition tools merged



add/remove vertices



move vertices



Form display of attribute data

- **Use of the NavTable extension**

- Synthetic view of attribute data for a particular feature
- Fill and update of attribute data easier

Table: Table d'attributs: cantons.shp

ID_GEOFLA	CODE_CA...	CODE_CHF	NOM_CHF	X_CHF_LIEU	Y_CHF_LIEU	X_CENTR...	Y_CEI
12	01	004	ANTRAIN	3174	23914	3141	23871
37	01	004	BEGARD	1846	24181	1881	24161
70	01	001	ALLAIRE	2620	23027	2602	23041
81	01	002	ARZANO	1684	23382	1671	23381
117	02	007	AURAY	2008	23099	2032	23091
135	02	005	BELLE-ISL...	1770	24094	1801	24061
158	02	006	ARGENTR...	3398	23455	3391	23421
165	02	004	BANNALEC	1495	23431	1502	23421
180	03	212	PLOUZANE	852	23987	867	23981
215	03	013	BOURBRIAC	1916	24003	1914	23981
219	03	012	BAIN-DE...	2993	23235	2996	23221
227	03	010	BAUD	1996	23332	1999	23401
264	04	020	BROONS	2591	23786	2582	23791
275	04	013	BELZ	1868	23118	1903	23111
328	04	022	BECHEREL	2823	23749	2852	23701
376	05	025	CALLAC	1734	23940	1730	23931

1 / 187 Total registres sélectionnés.



NavTable*: gdbms211f1915_130df9df65d_7ffe

Sélectionnés Sélectionner

Attribut	Valeur
ID GEOFLA	12
CODE CANT	01
CODE CHF	004
NOM CHF	ANTRAIN
X CHF LIEU	3174
Y CHF LIEU	23914
X CENTROID	3141
Y CENTROID	23871
CODE ARR	1
CODE DEPT	35
NOM DEPT	ILLE-ET-VILAINE
CODE REG	53
NOM REGION	BRETAGNE
pays	fouquères

1 / 187



Automation of the analysis process

- **Chaining Sextante algorithms to provide one specialized process**

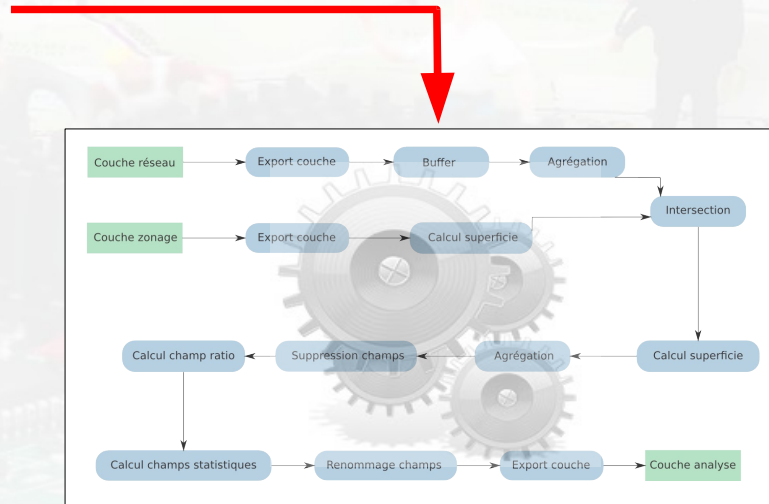
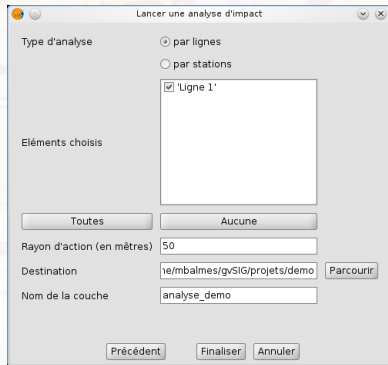


Table: Table d'attributs: Analyse

id_zone	population	area	area_b	ratio	populat_tx
1.0	1000.0	1109065.62...	98475.14188	0.08879	88.79

0 / 1 Total registres sélectionnés.



```
Java - extTransport/src/com/alkante/gvsig/transport/NetworkAnalyzer.java - Eclipse SDK
File Edit Source Refactor Navigate Search Project Run Window Help
Package Explorer Navigator build.xml build.xml NetworkAnalyzer.java CreateVarianteLigne
Outline
com.alkante.gvsig.transport
import declarations
NetworkAnalyzer 1.1.2.5
  AREA_FIELDNAME : String
  lyrNetwork : FLYrVect
  lyrZonage : FLYrVect
  outputFactory : gvOutputFactory
  taskMonitor : ITaskMonitor
  NetworkAnalyzer(FLYrVect, FLYrVect)
  analyze(double, int, List<Integer>, ...)
  doAnalyze(FLYrVect, FLYrVect, double)
  doBuffer(IVectorLayer, double, String)
  doComputeArea(IVectorLayer, String)
  doIntersection(IVectorLayer, IVectorLayer)
  doDissolve(IVectorLayer, int, String)
  doFieldCalculate(IVectorLayer, String)
  doCopy(IVectorLayer, String, String)
  doRenameField(IVectorLayer, int, String)
  doDeleteField(IVectorLayer, int, String)
  Pair<T, S>
History @ Javadoc Search Progress Problems Console Call Hierarchy
0 errors, 7 667 warnings, 0 others (Filter matched 100 of 7667 items)
Description Resource
Warnings (100 of 7667 items)
```

**Developing with gvSIG
Feedback**

Several aspects

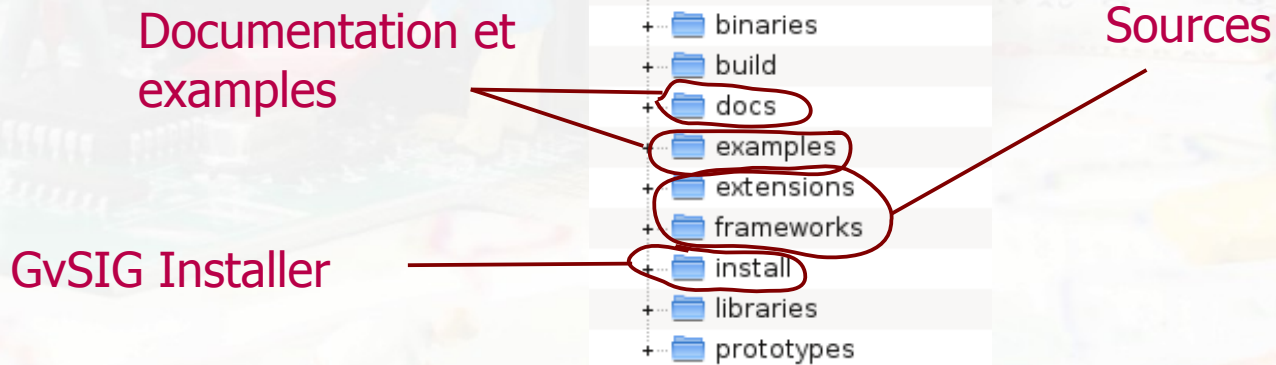
- Developing a business extension
- Customizing the GUI of gvSIG
- Packaging an install of gvSIG including a business extension



To start with

- **GvSIG version 1.10 stable (build 1264)**

- Sources available on gvSIG.org (SVN repository)
- Sextante included
- NavTable sources installed manually



Positive points...

- **gvSIG architecture based on extension make it quite easy to develop plugins**
- **Automatic procedure to set up Eclipse IDE fro gvSIG development**
- **Installer build script that can be easily modified**



Negative points...

- **Source code documentation (Javadoc) old (and not up to date with the stable release) et written in Spanish (Why not English ?)**
- **Examples/tutorials available with source code, but not up to date and not working the latest releases**
- **Miss a real developer documentation or a developer resource center**
 - We have to mix several documents (data models, API diagrams) taken from several places on the web



Somes figures...

- **Developing time...**

- 25 man-day (with no deep knowledge of gvSIG source code)
- excluding specifications, tests, training and project management.

- **Size of the extension**

- 10408 lines of Java
- 2% of all gvSIG extensions size
- 0,8% of gvSIG total code



Conclusion concerning development

- **First contact with gvSIG source code and gvSIG data Model should not be underestimated**
- **Minor bugs corrections (2)**
- **Developer list launched (since February) and quite active (>4 posts/day en May/June 2011)**



**How does it look like
and work ?**
(Some screenshots...)



The screenshot shows the gvSIG 1.10 software interface. The title bar reads "gvSIG 1.10:demo_blida.gvp". The menu bar includes "Fichier", "Afficher", "Table", "Fenêtre", "Aide", and "Transport". The "Transport" menu is open, showing options: "Nouveau réseau Alt+H" and "Analyse d'impact Alt+H".

The "Gestionnaire de projet" (Project Manager) window is active, displaying "Type de documents" (Document Types) with icons for "Vue" (View), "Table", and "Carte" (Map). Below this, the "Vue" (View) section shows a "Modèle de réseau" (Network Model) and a list of actions: "Nouvel amer" (New marker), "Ouvrir" (Open), "Renommer" (Rename), "Supprimer" (Delete), and "Propriétés" (Properties).

The "Propriétés du project" (Project Properties) section shows:
Nom du projet: demo_blida.gvp
Enregistré: C:\obedel\gvSIG\test_transport\demo_blida\demo_blida.gvp
Date de création: 30 juin 2011

At the bottom, the status bar shows "writing_project: demo_blida.gvp", "Mètres", "X = 29,08", "Y = 99,37", and "EPSG:30791".

Créer un nouveau réseau [X]

Créer un nouveau réseau de lignes et de stations à partir d'un modèle et en s'appuyant sur des couches référentiel

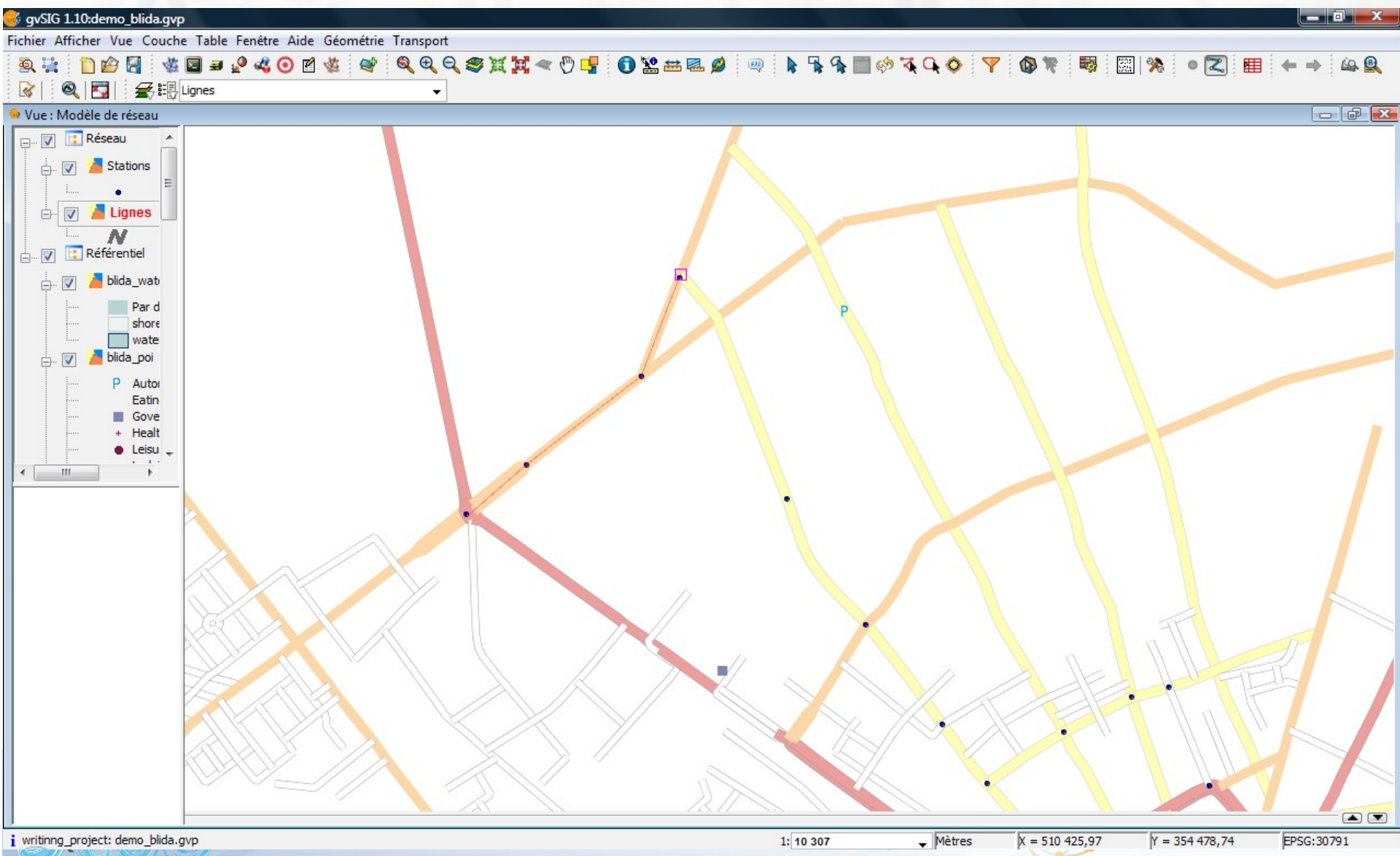
Répertoire de stockage: C:\jobedel\gvSIG\test_transport [Parcourir]

Nom du réseau: demo_blida

Référentiel: Blida [v]

[Créer] [Annuler]





The screenshot shows the gvSIG 1.10.0 interface. The main map displays a network of lines in various colors (red, orange, yellow, black) on a white background. A left sidebar shows a layer tree with 'Réseau' expanded to 'Lignes'. A 'NavTable: Lignes' window is open on the right, displaying two tables of data for a selected line.

NavTable: Lignes

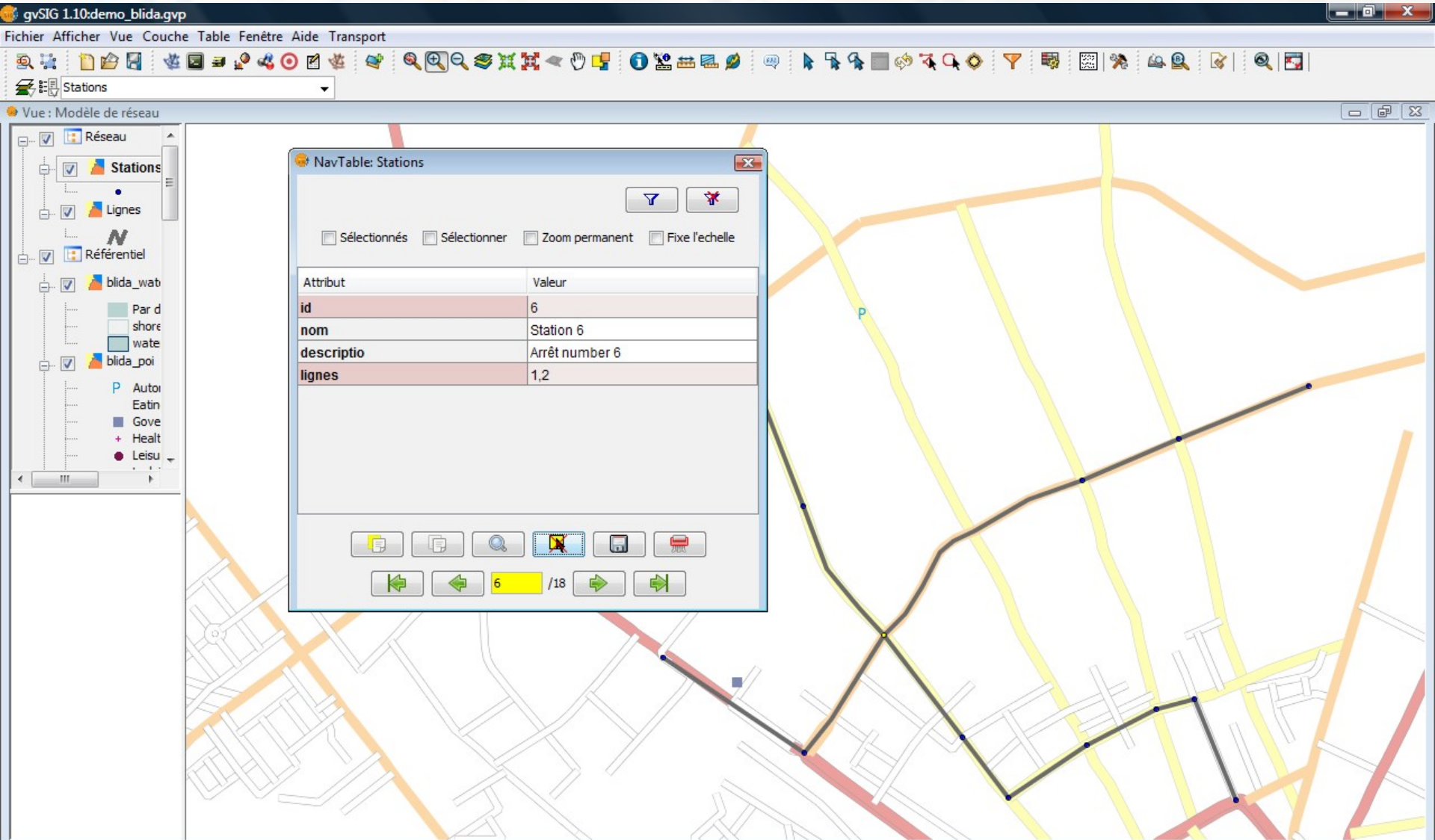
Sélectionnés Sélectionner Zoom permanent Fixe l'échelle

Attribut	Valeur
id	1
nom	Ligne principale
descriptio	Ligne historique
depart	Echangeur
arrivee	Centre Est
stations	1,2,3,4,5,6,7,8,9,10,11,13,12

Attribut	Valeur
id_depart	1
id_arrivee	'Station 1'

Station 6'
Station 7'
Station 8'
Station 9'
Station 10'
Station 11'
Station 12'
Station 13'

Synchronizing bus lines/bus stops



Area based impact analysis

The screenshot displays the gvSIG 1.10 software interface. The title bar reads "gvSIG 1.10:demo_bllida.gyp". The menu bar includes "Fichier", "Afficher", "Vue", "Couche", "Table", "Fenêtre", "Aide", and "Transport". The toolbar contains various icons for file operations, navigation, and analysis. The main window title is "Vue : Modèle de réseau". A button labeled "Lancer une analyse d'impact" is visible above the map. The map shows a network of roads and paths with several highlighted zones: "Zone industrielle", "Zone Nord Est", and "Zone Historique". A legend on the left side of the interface lists the layers and their symbols:

- Réseau
- Stations
- Lignes
- Référentiel
- zonage
 - blida_wat
 - Par d shore
 - wate
 - blida_poi
 - P Autor
 - Eatin
 - Grove

The status bar at the bottom provides the following information: "Lancer une analyse d'impact", scale "1: 20 613", unit "Mètres", coordinates "X = 508 229,05" and "Y = 355 828,11", and projection "EPSG:30791".

gvSIG 1.10:demo_blida.gvp

Fichier Afficher Vue Couche Table Fenêtre Aide Transport

Référentiel

Vue: Modèle de réseau

zonage

Réseau

Stations

Lignes

Réf

Lancer une analyse d'impact

Couche zonage: zonage

Propriétés à considérer pour le calcul: popu

Précédent Suivant Finaliser Annuler

Zone industrielle

Zone Nord Est

Zone Historique

1: 20 613 Mètres X = 508 286,32 Y = 355 817,21 EPSG:30791

The screenshot shows the gvSIG 1.10 software interface. The main window title is "gvSIG 1.10:demo_blida.gvp". The menu bar includes "Fichier", "Afficher", "Vue", "Couche", "Table", "Fenêtre", "Aide", and "Transport". The toolbar contains various GIS tools. The left sidebar shows a project tree with "zonage" and "Réseau" layers. The main map area displays a network of roads and zones: "Zone Nord Est", "Zone industrielle", and "Zone Historique". A dialog box titled "Lancer une analyse d'impact" is open, with the following settings:

- Type d'analyse: par lignes, par stations
- Eléments choisis: 'Ligne principale', 'Ligne 2'
- Rayon d'action (en mètres): 50
- Destination: C:\pbedel\gvsg\test_transport
- Nom de la couche: Analyse_1

Buttons in the dialog include "Toutes", "Aucune", "Parcourir", "Précédent", "Finaliser", and "Annuler". The status bar at the bottom shows "writing_project: demo_blida.gvp", scale "1: 20 613", units "Mètres", and coordinates "X = 508 286,32", "Y = 355 817,21", and "EPSG:30791".

gvSIG 1.10:demo_bliida.gvp

Fichier Afficher Vue Couche Table Colonne Fenêtre Aide Transport

Vue: Modèle de réseau

Analyse

- zoning
- Réseau
- Stations
- Lignes
- Référentiel
- blida_water
- blida_poi
- blida_natural
- blida_location
- blida_highway
- blida_coastline
- blida_administrative

Table: Table d'attributs: Analyse

id_zone	popu	area	area_b	ratio	popu_tx
3.0	2000.0	676716.20723	58210.89966	0.08602	172.04
1.0	1500.0	1491066.58...	177958.09534	0.11935	179.025

1 / 2 Total registres sélectionnés.

Zone Nord Est

Zone industrielle

Zone Historique

writing_project: demo_bliida.gvp

Mètres X = 511 901,45 Y = 354 991,12 EPSG:30791

Questions ?



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