



# FIG Working Week 2012

Rome, Italy 6–10 May

Knowing to: Manage the territory  
Protect the environment  
Evaluate the cultural heritage



## The subsoil cadastre of Mazara del Vallo

Maurizio Federà - Italy



Collegio Provinciale  
Geometri e Geometri Laureati  
di Trapani

Platinum sponsors:



esri



Trimble



# FIG Working Week 2012

Rome, Italy 6–10 May

Knowing to: Manage the territory  
Protect the environment  
Evaluate the cultural heritage



## The subsoil cadastre of Mazara del Vallo

- The project, born from an idea of the Provincial College of the Surveyors of Trapani and from the synergy between the administration of Mazara del Vallo, with the Surveyors Professional Organizations :
  - ◆ the National Council
  - ◆ the Provincial College
  - ◆ the Social Security Fund Institute of Surveyors
- has seen the participation of some young Surveyors registered to the Professional Register of Surveyors and the involvement of a team of young trainees Surveyors, coordinated by expert topographers with proved experience.



Collegio Provinciale  
Geometri e Geometri Laureati  
di Trapani



Platinum sponsors:



esri



Trimble



Maurizio Federà - 2



# FIG Working Week 2012

Rome, Italy 6–10 May

Knowing to: Manage the territory  
Protect the environment  
Evaluate the cultural heritage



## Directive 3<sup>rd</sup> March 1999

Provincial Capital Municipalities and cities with a population over thirty thousand citizens or with a high seasonal tourist impact have to draw up an organic plan for the rational use of the underground:



### General Urban Plan of Subsoil Service (PUGSS)

That is part of the

General Town-Planning Scheme  
"Piano Regolatore Generale" (PRG).



Platinum sponsors:



Maurizio Federà - 3



# FIG Working Week 2012

Rome, Italy 6–10 May

Knowing to: Manage the territory  
Protect the environment  
Evaluate the cultural heritage



## Survey and graphic restitution

The survey has been carried out recording and mapping underground services with the support of:

- ◆ aero-photogrammetric maps
- ◆ the General Town-Planning Scheme of Mazara del Vallo
- ◆ the Cadastral Cartography.

These documents have been digitised and graphically represented, with the creation of a data base available on Mazara del Vallo Municipality web site.



Platinum sponsors:



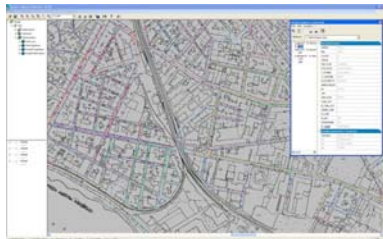
Maurizio Federà - 4



### Survey and graphic restitution

Data acquired and catalogued has been geo-referenced and graphically represented within a web-oriented GIS, in order to allow the online usability and an optimal communication between council offices and consumers.

Tecnologies used:



GIS



GPS



Platinum sponsors:

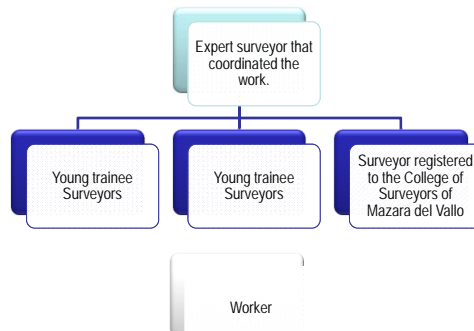


Maurizio Federà - 5



### The team of surveyors

4 teams composed by 4 surveyors + one worker



Platinum sponsors:

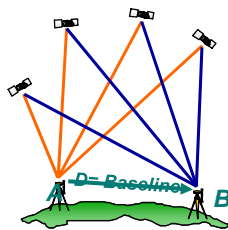


Maurizio Federà - 6

## Training Course

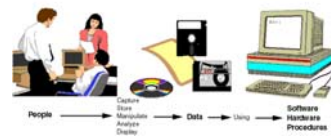
All professionals have been trained with a two weeks long course, to provide them with a wider knowledge about GPS and GIS tools, focusing on theory and practice of fundamental disciplines that let them face soon with the field survey.

### MAIN GOAL: Formation of Specialised Professionals



GPS Course

### GIS Course



Platinum sponsors:



Maurizio Foderà - 7

## Instruments

The Surveyors were provided with a hand held computer (Leica Geosystems GS20) with a receiver and integrated antenna GPS in order to collect data for creating and updating GIS data, allowing measurements with sub-meter precision.



### GPS LEICA GS20

- ◆ 12 channels
- ◆ Code C/A and phase L1
- ◆ Sub-metric precision

Platinum sponsors:



Maurizio Foderà - 8





# FIG Working Week 2012

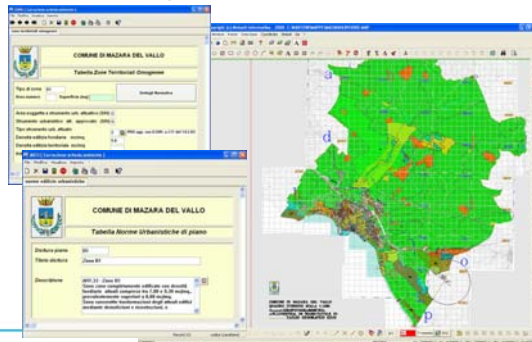
Rome, Italy 6–10 May

Knowing to: Manage the territory  
Protect the environment  
Evaluate the cultural heritage



## GIS Software

The GIS software chosen for the data acquisition platform was the one used by Mazara del Vallo Municipality for its land management: KARTO of Miduell Informatika of Belluno.



Platinum sponsors:



Maurizio Federà - 9



# FIG Working Week 2012

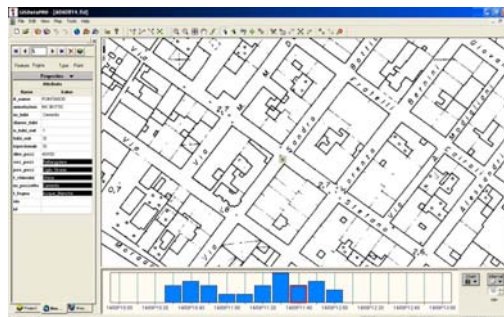
Rome, Italy 6–10 May

Knowing to: Manage the territory  
Protect the environment  
Evaluate the cultural heritage



## GIS Software

For data post-processing was used GISDatapro that allows import/export, visualisation and processing of data acquired with GS20.



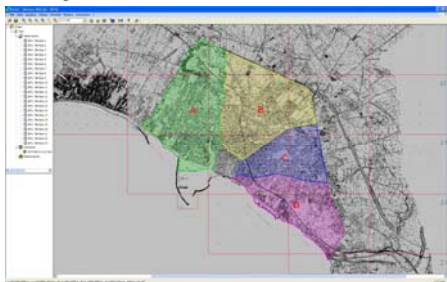
Platinum sponsors:



Maurizio Federà - 10

### Operative Steps

Urban and extra-urban areas were divided into four sectors, covering an area of about 828 ha of the 27.000 ha of the total council area, each of them assigned to a team of Surveyors.



#### Survey of:

- ◆ Hydraulic system
- ◆ Sewer system
- ◆ Methane gas system
- ◆ Public illumination system
- ◆ Electricity system

Platinum sponsors:



Maurizio Foderà - 11

### Survey operations



The Fast-static method in post-processing has been used for positioning the points, with intervals of 10-20 seconds and relating to a permanent station of the network ASI-Agenzia Spaziale Italiana, named NOT1, 230 km far away from Mazara del Vallo.



When the satellite signal was low, the points were positioned measuring the distance from two known points and insert manually after measurements were taken with a metric tape.

Platinum sponsors:



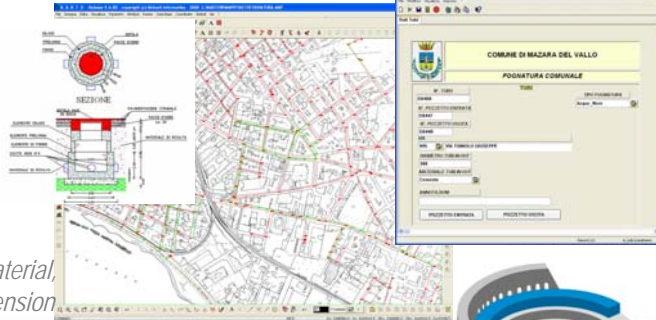
Maurizio Foderà - 12



### GIS Attributes



While the GPS points were gathered, the surveyors entered the related attributes in the database



*Id. number, street name, material, shaft position, section, dimension*

Platinum sponsors:



Maurizio Foderà - 13



### Survey results

#### Sewer system

- Waste water manhole: No.1.890
- Storm water manhole: No.583

#### Hydraulic system

- Manhole: No.500
- Valve: No.26

#### Public Illumination System

- Light point: No.5.221
- Panel: No.16

#### Electricity System

- Cabin: No.88

Platinum sponsors:



Maurizio Foderà - 14





# FIG Working Week 2012

Rome, Italy 6–10 May

Knowing to: Manage the territory  
Protect the environment  
Evaluate the cultural heritage



## Data transfer

Every day data acquired on the field were downloaded into the central system at the Regional Informative Territorial System (SITR) office of Mazara Del Vallo and then data registered from the permanent station were retrieved in order to download the RINEX files of the survey day.  
[http://geodaf.mt.asi.it/html\\_old/gps/gps\\_browse.html](http://geodaf.mt.asi.it/html_old/gps/gps_browse.html)



Platinum sponsors:



Maurizio Foderà - 15



# FIG Working Week 2012

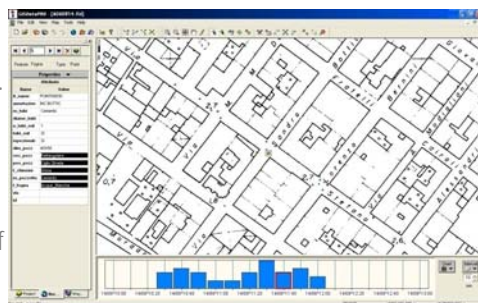
Rome, Italy 6–10 May

Knowing to: Manage the territory  
Protect the environment  
Evaluate the cultural heritage



## Data transfer

Data from the field were processed using GISDatapro and then the coordinate were transformed from WGS84 into Gauss Boaga. This allowed a first verification of acquired data quality, compared with the digital cartography. Another control has been done on the results of the calculations, in order to verify whether the mean square deviations of the survey were acceptable and were within the accuracy limits required in relation to the scale of representation of the cartography used



Platinum sponsors:

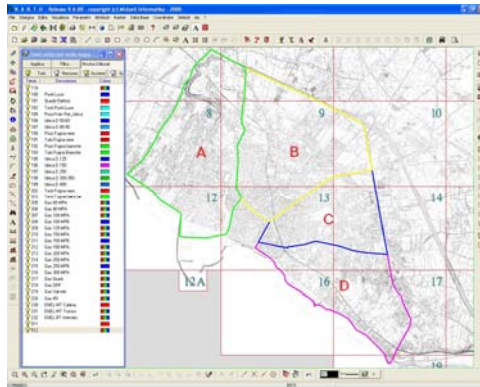


Maurizio Foderà - 16





### The Base Cartography



- ◆ 22 aerial photogrammetric maps
- ◆ Scale 1:2000
- ◆ Mapped in 1987

Platinum sponsors:

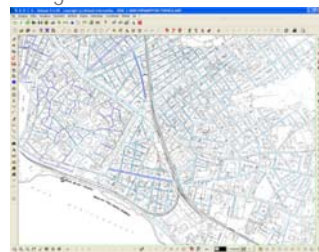


Maurizio Foderà - 17



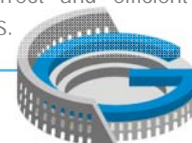
### GIS-network drawing

Networks were drawn and maps were created for each of them, in order to make easier their management from the different council offices in charge of it.




The different maps, with the same reference system, can be overlapped and consulted allowing a complete vision of the underground services and their interferences, necessary for a correct and efficient planning and maintenance operations.

Platinum sponsors:



Maurizio Foderà - 18


Maurizio Foderà - 19



# FIG Working Week 2012

Rome, Italy 6–10 May

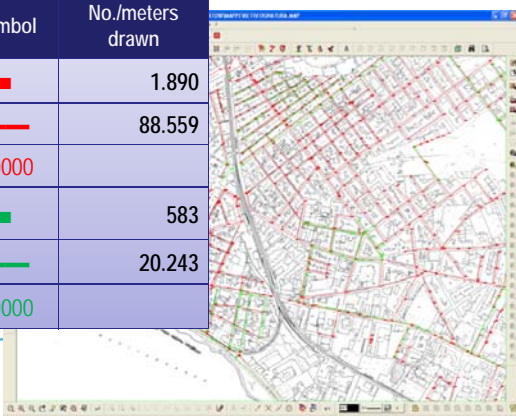
Knowing to: Manage the territory  
Protect the environment  
Evaluate the cultural heritage







---

## GIS-network drawing (e.g. Sewerage map)

Mappa Fognatura			
Layer	Description	Symbol	No./meters drawn
Pozz fogna nere	Waste water sewerage manhole	■	1.890
Tubi fogna nere	Waste water sewerage network	—	88.559
Testi fogna nere	Waste water sewerage text	A0000	
Pozz fogna bianche	Storm water sewerage manhole	■	583
Tubi fogna bianche	Storm water sewerage network	—	20.243
Testi fogna bianche	Waste water sewerage text	A0000	



Platinum sponsors:

Maurizio Foderà - 20



# FIG Working Week 2012

Rome, Italy 6–10 May

Knowing to: Manage the territory  
Protect the environment  
Evaluate the cultural heritage




---

## Conclusions

Data obtained with this survey has been recorded on a magnetic support and distributed to all professionals of Mazara del Vallo.

Data have been made available online on the city's web site, for consultation from the operators of the sector and from the company suppliers of the services, in order to give them a complete vision of the available underground services.

It will be registered and updated with new installations of underground services.

Useful tool for professionals, technicians of the municipality offices, foreman and workers, for planning maintenance interventions, querying and updating GIS data.

Important aid to the municipal administration on defining the priority of resources allocation, for planning and modification of works, keeping under control the social costs in terms of traffic issues, risks, waste of time for the community, consequently to a bad planned works activities.

The system is important for environment protection because avoiding traffic congestions it is possible to control air pollution levels.



Platinum sponsors:







# FIG Working Week 2012

Rome, Italy 6–10 May

Knowing to:

Manage the territory  
Protect the environment  
Evaluate the cultural heritage



## Acknowledgement

- ◆ All surveyors involved in the project
- ◆ Provincial College of the Surveyors of Trapani
- ◆ CNGeGL
- ◆ Social Security Fund Institute of Surveyors

**Thank you  
for your kind attention**

For more information:

**Maurizio Foderà**

Email : [colgeotp@comeg.it](mailto:colgeotp@comeg.it) - [m.fodera@studiotopografia.it](mailto:m.fodera@studiotopografia.it)

Platinum sponsors:



esri



Trimble



21