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Proceedings

2nd EC - GIS Workshop

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16441

INSTITUTE FOR SYSTEMS INFORMATICS AND SAFETY



# Proceedings of the 2nd EC - GIS Workshop

Genova, Italy - 26-28 June, 1996



 **JOINT  
RESEARCH  
CENTRE**  
EUROPEAN COMMISSION



CNR  
Istituto per la  
Matematica  
Applicata



**GISIG**  
Geographical  
Information  
Systems  
International  
Group

1996

16441 EN

INSTITUTE FOR SYSTEMS INFORMATICS AND SAFETY



# Proceedings of the **2nd EC - GIS Workshop**

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Edited by  
R.J. Peckham

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## Foreword

The 2nd EC GIS Workshop was held in Genova from 26th to 28th June 1996. It was organised by the Joint Research Centre, Institute for Systems Informatics and Safety as part of its support to Directorate General III (Industry) in the area of Geographic Information Systems.

The aims of the workshop were:

- to present progress in GIS projects and other related projects supported by the European Commission
- to identify synergies between ongoing European GIS projects
- to discuss emerging issues related to the formation of a European Geographical Information Infrastructure, and hence
- to assist in formulating longer term objectives for Commission sponsored activities.

The intention was also to establish and maintain contacts, to enable consultation and cross fertilization between participants in European GIS projects.

These aims were substantially achieved by an attendance of over 60 people and a series of stimulating presentations and discussions.

This report represents a selection of the papers which were presented at the workshop together with the abstracts of all those papers addressing European Issues. A collection of all abstracts and copies of overhead transparencies presented in the meeting has been prepared separately.

Also reported here is the discussion which was held at the end of the workshop and two further contributions to the discussion which were submitted by participants, following reflection, after the workshop.

In addition to general distribution among practitioners using Geographic Information Systems and data, the report will be submitted to an expert panel for consultation during preparation of a strategy document aimed at improving coordination of GIS and GI initiatives sponsored by the European Commission. It is hoped that in this way the workshop, and this report, will have made a contribution to the ongoing process of meetings and discussions in Europe aimed at achieving greater harmony and interoperability among geographic data and information systems.

Local arrangements for the Workshop in Genova were organised by the Geographical Information Systems International Group - GISIG - and thanks are due to Giorgio Saio, Emmanuele Roccatagliata and Caterina Gaeta for their enthusiastic and efficient support. Thanks are also due to the Italian National Research Council (C.N.R.) and the Mediterranean Association for Management of Gas and Water (A.M.G.A.) for the provision of excellent premises and facilities.

R.J. Peckham  
JRC, Ispra  
August 1996

## Contents

### European Issues

Towards a European Policy Framework for Geographic Information <b>W. Janusch</b> .....	3
The IT Programme and Geographical Information Systems <b>U. Boes</b> .....	5
MEGRIN: a pragmatic approach towards a European Geographic Information Infrastructure <b>F. Salgé</b> .....	6
Putting EGII (European Geographic Information Infrastructure) in a wider Context <b>C. Chenez</b> .....	7
Standards, a necessary foundation for the EGII: the results of 4 years work in CEN/TC287, the official standardisation group in the field of Geographic Information <b>F. Salgé</b> .....	11
GIS activities in the Joint Research Centre <b>G.G. Wilkinson, R.J. Peckham</b> .....	12
The Centre for Earth Observation (CEO) - a Project for Europe <b>P.N. Churchill, G. Maracci</b> .....	24
Science, Systems and Society- Putting the "S" in GI-2000 <b>P. Burrough</b> .....	43

### Projects

GISIG, an International GI Network <b>G. Saio, E. Roccatagliata</b> .....	47
"EGIS": Pan European GIS and Information System <b>A. Albanis</b> .....	55
On the creation of a European Forest GIS <b>S. Folving, C. Hoffmann, P. Kennedy</b> .....	79
Development of a Structured Urban Land Use Classification System <b>R. Bartlett</b> .....	92

Geological Information and 3D GIS <b>D.C. Ovadia</b> .....	104
---	-----

### **User Needs**

User Needs in City Planning and Risk Evaluation of Cultural Heritage <b>G. Accardo, M. Salvemini</b> .....	109
---	-----

Schools Geo-Marketing Services Management from the Users Point of View <b>M.A. Esposito</b> .....	121
--	-----

Data Access for Municipality Management using the WWW <b>C. Bohner</b> .....	131
---	-----

### **Technical Developments**

Developments in Parallel Processing for GIS <b>M.J. Mineter</b> .....	141
--	-----

A Step towards Virtual GIS using the Catalogue Interoperability Protocol <b>M. Krynitz, A. Kjeldsen</b> .....	151
--	-----

### **Report on the Final Discussion**

Report .....	159
--------------	-----

Replies from Megrin .....	163
---------------------------	-----

Comments from J. Rowley .....	165
-------------------------------	-----

List of Participants .....	167
----------------------------	-----

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## School Geo-Marketing: Services Management from the Users Point of View

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ET (Environment Team)

### Abstract

Today Local Administration in Europe has to manage two appearingly contradicting tasks: on one hand the quality improvement in services, according to user needs; on the other hand the requirement to meet the optimised use of lower budgets.

The case study of school service management in Italy clearly shows these elements and outlines the need of new decision support implements to achieve the optimisation of planning resources in relation to the scenario of a specific territory expressed in terms of objectives and criteria.

Within the study the conceptual model for the managerial analysis has been defined, in comparison with the model of Italian norms that fixes technical standards in terms of quality objectives, annual facility management and planning procedures.

The study has been based on the hypothesis of a GIS implementation for planning facility management for local administration and has been focused on the design of a conceptual application model.

The schools facility has been considered as a service network related to user catchment areas. For example small catchment areas correspond to primary school districts and larger catchment areas are related to high schools. Close walk distances are typically considered in relation to primary school accessibility as well as the distance in terms of transportation network stops has been considered for high schools, etc.

This way a model for Geo-marketing management of school facilities has been built, relating localisation, technical profile of building facilities, characteristics of catchment area, final users profile (no. of users per age, etc.), available annual resources (financial, personnel, a.m.).

School buildings are considered in the model as a class of geographic entities linked to alphanumeric attributes describing their characteristics and their relationship with the urban environment (transportation, parks, sports facilities, pollution in the area, etc.).

Based on this model implemented on a GIS technological support, local authorities are able to plan and manage effectively "utilisation plans" for annual school facilities as required by recent norms.

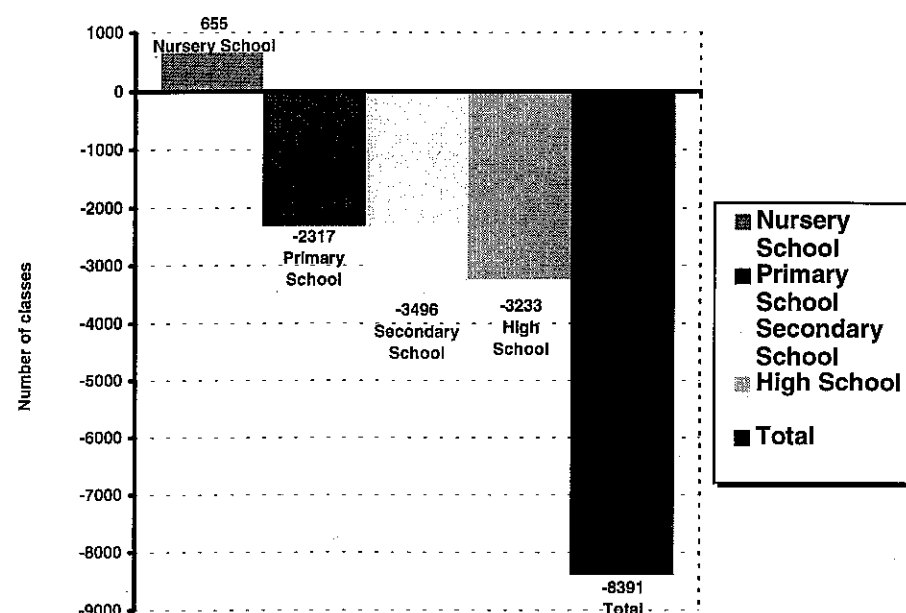
The study has been developed in collaboration with the regional department for school services (Regione Toscana- Giunta Regionale / Servizio Scuola). The model has

been based on the data of all the school buildings of the database owned by the service for statistics of Regione Toscana - Giunta Regionale.

### The School Service Scenario

The next school year in Italy will be characterised by a decrease in number of classes (total no. -8391) for all levels and order of schools except the primary school that increase the total number of classes of 655 units (see tab.1).

Tab. 1 - Number of classes for the school year 97-98 total balance



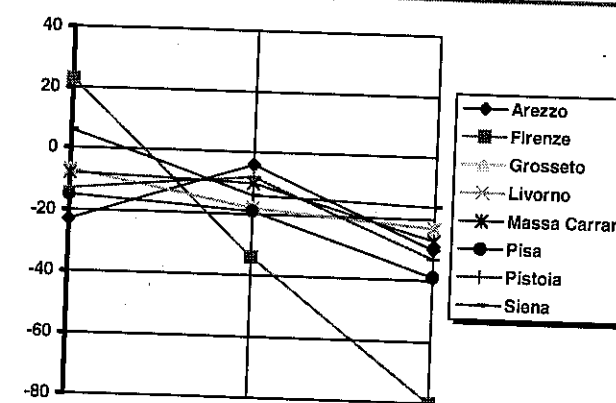
Nursery School	Primary School	Secondary School	High School	Total
655	-2317	-3496	-3233	-8391

First of all this fact is caused by a school population decrease and also by an increase of the ratio number of students/number of classes. This aspect is also related to an overall cut of school financial resources assignment equivalent to approximately -1200 billions Italian lira for the next year.

In the Tuscany region the phenomenon follows the national trend (see tab.2). Still we observe a gap between the decrease of demand and the unproportionally higher decrease of resources.

Tab. 2 - Decrease of number of classes by provinces in Tuscany for the school year 97-98

	Nursery School and Primary School	Secondary School	High School
Arezzo	-23	-4	-30
Firenze	+23	-34	-80
Grosseto	-7	-18	-23
Livorno	-7	-18	-23
Massa Carrara	-8	-10	-27
Pisa	-15	-19	-39
Pistoia	-13	-8	-33
Siena	+6	-14	-16



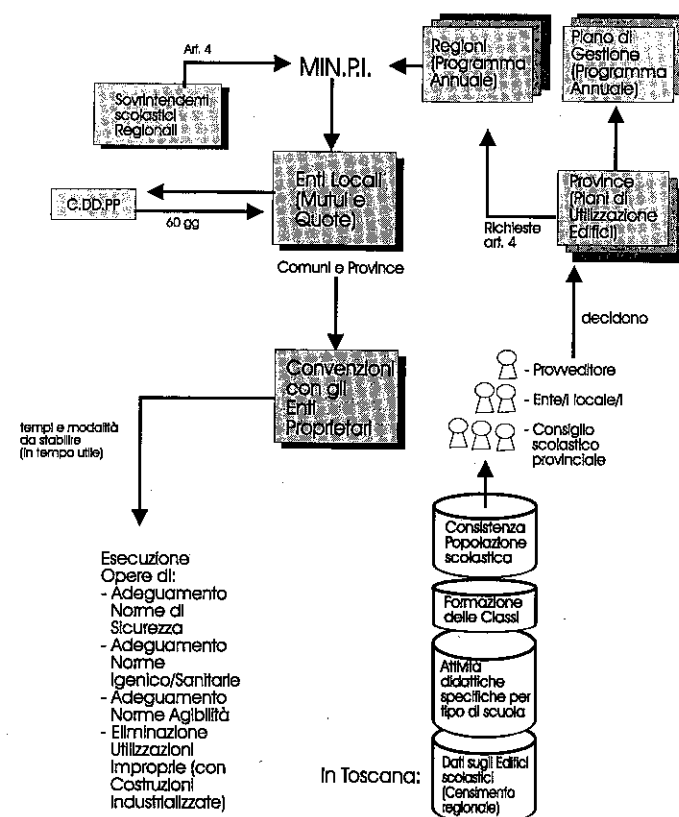
Therefore a selection by Authorities involved in school service programming is requested relating to how and where financial resources for operating and maintenance of buildings should be used.

In brief not all the school buildings potentially available could be used every year.

It's still necessary to operate a detailed analysis of the demand distribution and characteristics. We should in practice analyse much better the market of this service to rationalise its delivery, attempt to satisfy the user requirements.



School facilities utilisation related decisions are taken by Provinces according to the Provincial Education Office Superintendent (Provveditore agli Studi), with the Assessor of Education and Cultural Activities Department at the Municipality (Assessore alla Cultura e Scuola del Comune) and with the Provincial School Council (Consiglio Scolastico Provinciale). On the basis of utilisation plans financial resources are requested to the Regional Government that also applies an annual program within the overall budget for the Central Government (see fig.1).



<sup>1</sup> (1996), LN 11/01/96, п. 23.

<sup>2</sup> (1975), LN 5/08/75, n. 412; (1988), LN 5/09/88, n. 390.

**Tab. 3 - Influenced territory of schools by level and order**

nursery school	primary school	secondary school	high school
urban blocks (municipality)	school districts (municipality)	provinces	provinces

Accordingly with this norm a series of quality parameters are fixed for school's lots, regarding the urbanistic and ecological point of view, for school buildings as well as for sport facilities.

In the study the annual school facilities management has been considered as a geo-marketing problem: buildings utilisation options and resources destination have been confronted with the catchment area profile associated to each level and grade of schools and also has been considered in relation to building characteristics (see fig.3: classes of attributes of the school buildings entities).

The catchment area is formed by the resident population within correspondent age range in the influence area: i.e. the block for the primary schools, the entire Municipality administrative territory for the secondary school, the entire province for the high school. This represents very well the demand on the quantitative side.

An entity-relationship model has been defined to describe the demand and the supply of the school service. In particular as attributes to the catchment areas have been considered (see fig.2):

- the demographic and economic characteristics of the influenced territory, referring to the population trends;
- the effectiveness of the users;
- type and number of schools;

<sup>3</sup> (1975), DM 18/12/75, Norme per l'edilizia scolastica.

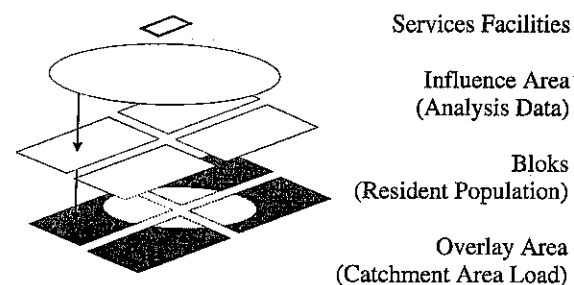


Fig. 2 - Catchment area of a service

The representation of the supply is more complex because of the integration of quality related parameters within areas and school buildings. This parameters have been considered as attributes classifying areas considered as graphical entities.

The area attributes are shown in tab.4. In this class variables are mostly describing urban environment quality:

- urbanistic zoning;
- times and mode of mileage;
- general characteristics.

Tab. 4- Parameters for the localisation of school buildings

1. Zoning and localisation	<ul style="list-style-type: none"> <li>• assessment of ecological condition;</li> <li>• observation and proposals done by Consiglio Scolastico Provinciale and by Consigli Scolastici Distrettuali;</li> <li>• zoning assignment;</li> <li>• demographic development;</li> <li>• economic activities;</li> <li>• cultural facilities;</li> <li>• existent school buildings.</li> </ul>
2. Time and mode of mileage	<ul style="list-style-type: none"> <li>• Nursery School: max. foot distance 300 m;</li> <li>• Primary School: max. foot distance 500 m; max. transportation network stop distance 15 min.;</li> <li>• Secondary School: max. foot distance 1000 m; max. transportation network stop distance 15-30 min.;</li> <li>• High School: max. transportation network stop distance 15 min.;</li> </ul>
3. Area's general characteristics	<ul style="list-style-type: none"> <li>• area shape;</li> <li>• local winds;</li> <li>• orography;</li> <li>• terrain moisture;</li> <li>• access to the area;</li> <li>• entrance receding zone;</li> <li>• close highways;</li> <li>• tree and parks;</li> <li>• sports facilities;</li> <li>• pollution sources.</li> </ul>

The building attributes are ranked in the following classes (see fig.3):

- localisation;
- dimensional consistency;
- spatial and technological characteristics;
- maintenance status;
- in-door environmental quality;

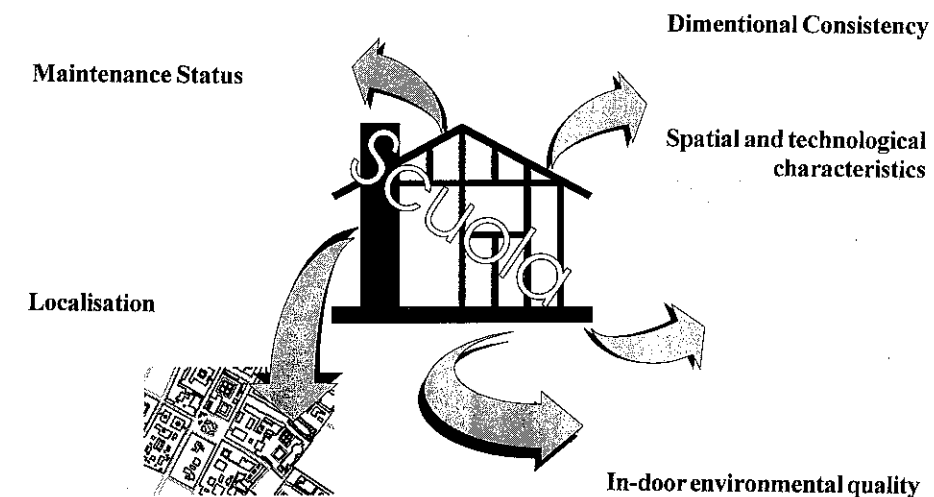


Fig. 3 - School building attribute classification

Other classes of entities necessary for the analysis are the following (see tab.5):

- transportation networks;
- urban parks;
- sport and cultural facilities;
- source of pollution.

A. Areas	B. Pollution sources	C. Urban parks	D. Buildings	E. Sport & cultural facilities	F. Urban transportation networks
<b>Ecology:</b> <ul style="list-style-type: none"> <li>• soil moisture</li> <li>• land slides</li> </ul>	<ul style="list-style-type: none"> <li>• dumps</li> <li>• industries</li> </ul>	<ul style="list-style-type: none"> <li>• topology</li> <li>• typology</li> </ul>	<ul style="list-style-type: none"> <li>• localisation</li> <li>• dimensional consistency:               <ul style="list-style-type: none"> <li>* total surface</li> <li>* maintenance status</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• gymnasium types</li> <li>• long jump tracks</li> </ul>	<b>Networks/modes:</b> <ul style="list-style-type: none"> <li>• foot-path system</li> <li>• car-path system</li> <li>• bus network</li> <li>• rail network</li> </ul>
<ul style="list-style-type: none"> <li>• tree and parks</li> </ul>	<ul style="list-style-type: none"> <li>• gas emissions</li> </ul>	<ul style="list-style-type: none"> <li>• extension</li> </ul>	<ul style="list-style-type: none"> <li>• in-door environmental quality</li> <li>• spatial and technological characteristics:               <ul style="list-style-type: none"> <li>* n° of floors</li> <li>* open external spaces</li> <li>* didactic's space</li> <li>* n° of alumni</li> <li>* cafeteria's area</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• sports fields</li> <li>• discus areas</li> <li>• 100 m race tracks</li> <li>• swimming pools</li> </ul>	<b>Stops distance:</b> <ul style="list-style-type: none"> <li>• nursery school max. distance 300 m</li> <li>• primary school max. distance 500 m</li> <li>• etc.</li> </ul>
<b>Geography:</b> <ul style="list-style-type: none"> <li>• georeferencing</li> </ul>	<ul style="list-style-type: none"> <li>• air pollution</li> <li>• pounds and stagnant water</li> </ul>				
<b>Urbanistic:</b> <ul style="list-style-type: none"> <li>• zoning assignment</li> </ul>	<ul style="list-style-type: none"> <li>• noise pollution</li> </ul>				
<b>Topology:</b> <ul style="list-style-type: none"> <li>• entrance receding zone</li> <li>• closeness to highways</li> <li>• closeness to railways</li> <li>• closeness to abandoned industrial areas</li> </ul>	<ul style="list-style-type: none"> <li>• cemeteries</li> </ul>				

Particular attention has been paid to select attributes of urban environment entities. This represents a critical point of the supply model: in every territory the availability, reliability and up-dating of data should be verified before the implementation of an application. Where these data are not available today is possible to create them using new satellite data i.e. for natural elements and parks or pollution sources reducing the costs for data capture and update.

**Sorgente Dati**

- Regione
- Uff. Urbanistica del Comune
- Catasto
- Municipalizzate
- Altro

- Regione
- Uff. Edilizia Pubblica del Comune

- Proweditorato agli studi
- Anagrafe del Comune/I

- Min. PI.
- Cassa DD.PP.
- Banche locali
- Altro

**Tipi di dati**

**A - Cartografie**

- Immagini satellitari

**B - Attributi Edifici:**

- \* Localizzazione
- \* Caratt. SP/F.
- \* Caratt. Dim.
- \* Condiz. Amb.
- \* Stato Tecnol.
- \* Attrezzature sportive
- \* Sicurezza sismica

**C - Nomine**

- Attività didattiche per orline e grado
- Popolazione scolastica

**D - Finanziamenti disponibili**

- Quote di ripartizione
- Tassi

**Connessioni**

**On/Off Line**

**On Line**

**On Line**

**Off Line**

**AMBIENTE DI INTEGRAZIONE**

Informazioni Territoriali   Offerta Edilizia   Formazione delle Classi   Finanziamenti

OK

**Plani di Utilizzo e Gestione (annuali)**

Info. provv. Dati Immagine

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129

## Effectiveness in relation to the standard evaluation model

The described GIS application allows to verify, parameter by parameter as well as a complex simulation, the evaluation model according to standards (see note 3) that fix quality targets for areas and school buildings.

As urban environment is not a static reality and since also the demand related to school service is variable, utilisation plans should be considered as annual auditing related to expected quality of the service on one hand and related to the demand on the other hand.

To this aim the use of management implements such as GIS and SDSS (Spatial Decision Support Systems) offers a support for improving effectiveness of administrative decisions and in a word to allow an optimised use of limited resources. In this kind of applications allows to integrate all necessary data for decisions, and to evaluate a-priori decision effects to avoid errors.

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## Data Access for Municipality Management using the WWW

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The Commission of the European Communities<sup>1</sup> defined the development of new data access technology options as one of the approaches to use by designers and administrators for urban environment management. This request is based on the fact that one of the main problems in urban analysis and management is to improve the understanding of the behaviour of complex city systems under the pressure of technological trends and life style development. Until very recently all data required for an appropriate analysis of the urban environment have been stored as paper hard-copies. The decision of transferring these data on digital support has not been homogeneous, but happened one by one in every single public and private institution or sub-unit. This kind of development caused a distribution of urban data not only in different administrative units, but also on different hardware/software support and different database structures.

The technical details vary evidently from municipality to municipality, but it appears that the phenomenon occurs in most of the European local authorities. A case study on Florence (I) might serve here as example to demonstrate the general situation in European municipalities.

Florence : List of available geographic information								
Institution	Format	Environment	Output scale					
			1/25000	1/10000	1/5000	1/2000	1/1000	1/500
IGM	Digest and products	UNIX, VMS	X (and others)					
Catasto	DXF	UNIX				X	X	
Regione Toscana	R.T. translatable to DXF	UNIX			X Outline	X Non content		
Comune di Firenze - Ufficio Urbanistica	SIREG (Geosystems) and products	VMS			X Expansion Quakes	X Solid building content		
ENEL	ARC/INFO and others	UNIX, ARC/INFO, ORACLE	X Overview		X Raster	X	X	X
SIP	Standard SIP translatable to DXF	VMS				X	X	X
FIorentina GAS	SIREG	VMS				X		X
ATAF	TIFF	MACINTOSH				X		

Figure 1: Panorama of existing geographic data on the territory of Florence's municipality

<sup>1</sup> Commission of the European Communities, *City Action RDT Programme - towards a better liveable city (background paper)*, Brussels, 1994