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Homogeneization of the Archaeological Cartographic Data on a National Scale in Italy

Giovanni Azzena, Roberto Busonera, Federico Nurra, Enrico Petruzzi

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Homogenization of the Archaeological Cartographic Data on a National Scale in Italy

Giovanni Azzena
azzena@uniss.it

Roberto Busonera
rbusonera@uniss.it

Federico Nurra
fnurra@uniss.it

Enrico Petruzzi
epetruzzi@uniss.it

Department of Architecture, Design and Urbanism (DADU) – University of Sassari, Italy

Abstract: For decades now standardization, homogenization, and harmonization of digital archaeological cartographic data in Italy has been a major topic of debate.

The complex organization of state agencies, heterogeneously structured on different operational levels causes a disruption of the archaeological georeferenced information, one of the main problems that the SITAN (National Archaeological Geographic Information System) project aims to simplify and bring back to shared tools and languages. The paper will focus on the peculiarities of the ‘producers of information’, the different typology of data acquired and yet to be acquired, the possibilities of using them, and on forms of cooperation undertaken or in progress with different actors operating in the Sardinian regional context.

A turbulent environment, in which the difference is more acute between protection of public property and the profit of private interests — a heated public debate strongly felt and discussed through the media.

Keywords: Ancient topography, archaeological cartography, SITAN, standard

Introduction (G.A.)

Standardization, homogenization, and harmonization of the archaeological mapping data on a digital base are issues that, in Italy, have been debated over many decades.

In the Code of Cultural Heritage and Landscape¹ there is a particular motivation for the revitalization of cartographic activities of the archaeological heritage² resulting from a collaboration between the state and the regions to which some fundamental aspects on ‘landscape care’ are delegated. According to article 156 of Legislative Decree no. 42/04, it is expected that the regions and the Ministry of Heritage and Culture will collaborate in the drafting of Regional Landscape Plans and cooperate in the performance of protection of the cultural heritage.

In this context, in 2004 the Autonomous Region of Sardinia (RAS) was the first in Italy to adopt a Landscape Plan,³ paying particular attention to the creation of an original, historical and geographical alphanumeric database, generally based on specific categories of data already defined by the ICCD (Central Institute for Cataloguing and Documentation).⁴

The practical application of this system, especially as regards the extremely detailed scale of local archaeological surveys, has showed how basic methodological approaches are rarely integrated, a fact that produces a complex structure in the cooperation between different state agencies, differently structured on various operating levels, and causing serious disruption of the archaeological georeferenced information.

This contribution comes as part of a larger project, the creation of a National Archaeological Geographic Information System (SITAN), and attempts to provide a clear and complete illustration of the problems faced, starting with survey, interconnection, and dissemination of information about the ‘producers of archaeological data’ active on the island.

1 Heterogeneity of data and the need for standardization (R.B.)

To synthesize the complex cultural panorama of the choices that have developed over time in the Italian archaeological field is very difficult. It is, however, possible to highlight the gradually prominent role of computing, especially from a geographical point of view, responding promptly to the needs of archaeological practice.

But the capabilities and possibilities reached through these resources have quickly turned into one of the major problems affecting the whole national archaeological panorama.

¹ D.Lgs. 42/04 – Code of Cultural Heritage and Landscape.

² Art. 2, paragraph 2, of Legislative Decree no. 42/04.

³ PPR of RAS was approved by a resolution of the Regional Council no. 36/7 of 5 September 2006, following the L.R. no. 8 of 25 November 2004.

⁴ <http://www.iccd.beniculturali.it/>



After a positive start, characterized by the creation of a methodology to enliven and develop a technological approach to the historical and archaeological sciences, the thread of a new systematic approach that could combine good initiatives into a solid foundation of common and shared knowledge has been lost (Azzena 2009: 169).

These issues comes mainly from the large fragmentation of initiatives, which caused not only the loss of the potential offered by computer support, but the significance of a geographic and mapping approach to the archaeology and history of the cities and territories. This possibility has been in existence since 1870 (Azzena 2009: 170) and was finally realized by the creation of a unique National Archaeological Geographic Information System.

A 'progress report' of sorts on the state of the national archaeological and cultural heritage has been produced since 2007 by the 'Commissione paritetica per la realizzazione del Sistema Informativo Archeologico delle Città Italiane e dei loro Territori' followed, in 2009, by one from a second Committee.⁵

Because of the need to deal with the wide heterogeneity of data, caused by an apparent lack of coordination between the various research initiatives, the starting point of the project was the creation of 'geographical' information support for 'the preparation of a document containing the interoperability standards between systems, aimed at the identification of the essential requirements for GIS in archaeology in relation to the purposes of protection and knowledge' (Carandini 2008: 200).

The second Committee continued on the path taken by the previous one, in an effort to identify concrete actions for the creation and adoption of a standard for the national archaeological heritage GIS.

The adoption of the Landscape Plan of the Region of Sardinia, the first in Italy to conform with the guidelines laid down by the European Convention for the Landscape (Firenze 2000) and according to what is defined by Legislative Decree 42/04 — Code of Cultural Heritage and Landscape — seemed to give new energy to the activities of documentation of archaeological heritage in the form of GIS coordinated, planned, and linked to the 'co-planning' between the state and the regions.⁶

Unfortunately we also have to deal with an ongoing fragmentation of initiatives at regional level; this is still far from a systematic approach and is not directed towards a common knowledge base.

In Sardinia local governments have proceeded independently, creating different local surveys, often without scientific homogeneity and producing a confusing array of analytical equipment, similar to the archaeological 'core-zone' areas created in the Regional Plan, but rarely able to help to understand (and therefore design) contexts.

⁵ The 'Committee for the development and drafting of a project for the construction of the geographic information system of the Italian archaeological heritage', established by D.M., December 22 2009. In this regard see Sassatelli 2011: 99–102.

⁶ Legislative Decree 42/04, Art. 1 Section 3. Art. 5 requires that the regions, municipalities, metropolitan cities, and provinces cooperate with the Ministry of Heritage and Culture in the functions of cultural heritage protection.

It seems to have established a consolidated cultural and, consequently, legislative attitude, from which the idea derives that the informative apparatus should be 'site-oriented', with clear implications for the practice of protection. A situation no longer limited to research activity, but also extended to those related to the adoption of management Landscape Plans and those of urban and land management.

Because of its recent planning history,⁷ the region of Sardinia is a particularly favourable environment for the practical application of this system.

The project 'Creation and activation of the Sardinian pole of the Information Network for the national collective construction of web GIS of Italian archaeological heritage' aims to be a permanent and constantly updated reference for exchanging information on the archaeological heritage at different national and international levels (Figure 1).

2 The Structure of Data (E.P.)⁸

The structure of the SITAN system is based on the Univocal Identifying Code or 'CUI', an independent self-generating code, that can be related to all possible developments of the platform.

Firstly, the CUI is composed of the ISTAT code (National Statistics Institute)⁹ that indicates the region, province, and municipality in which the archaeological entity is located; secondly, by the geographical coordinates in degrees (giving six numbers after the decimal point); thirdly, by a random number or letter assigned by the system to avoid duplication due to the overlap of more than one element to identify (e.g. Monte Baranta 200900480839626440636566A).

To the CUI are associated, as well as the geometrical apparatus, the alpha-numeric information represented by a minimum set of obligatory values defined by the 'Alphanumeric Label', which represents the basic level of information extended to all categories and based on the items required by the 'Information Module' (MODI), as defined by the ICCD (Central Institute for Catalogue and Documentation).¹⁰ The 'Alphanumeric Label' is the connecting link between SITAN and the system of cataloguing and designation of the cultural heritage of MIBACT.

Compared to the synthesis achieved by the Sassatelli Committee (2011: 98–102), the Sardinian experiment opted for a further simplification of the information based on the minimum set of data acquisition required by MODI, which has decreased from 26 to 16 items of which 6 are generated directly from the system on a geographical basis and only the remaining 5 are mandatory. It was decided to match each dataset to an

⁷ The Sardinian Regional Law of 25 November 2004, no. 8, with the introduction of new Article n. 11 of the regional planning law no. 45/1989 has regulated the procedure of the Regional Landscape Plan (PPR) and has ordered that the municipalities approve their urban plans (PUC) as required by PPR.

⁸ The structure of the system, which is currently being experimented on, processed by the Sassatelli Committee is defined in the 'Final Committee Report' in which G. Azzena took part as responsible party for the 'Sardinian node'.

⁹ www.istat.it/it/

¹⁰ www.iccd.beniculturali.it/





FIG. 1. THE ARCHAEOLOGICAL RESEARCH NETWORK.

apparatus of metadata in accordance with ISO 19115: 2005, in order to have some sort of identity card of the actual drafters of the data and to have a functional reference to increase the information of each datum in SITAN. Each data set is linked to a metadata apparatus, a sort of ID card for material extenders of the datum and a functional reference in the exploration of information of each element present in the system.

The system is then included in the so-called ‘Areas of investigation’ (or ‘Identifiers’) systems of primary identification description; these are exclusively aerial, geographical, and topographical references that represent the minimum level of knowledge, called the ‘Maximum Common Divisor’ by the Sassatelli Committee, and are divided into five categories.

The ‘Identifiers’ are listed below:

1. Area of extended deposits

The synthesis between different Identifiers is achieved through the ‘Area of Extended deposits’. The overlapping of the levels below leads to a complex network of archaeological phenomena and links among identifiers.

2. Area of general investigation

Archaeological surveys, graduate dissertations, and all investigations that do not include an archaeological excavation — a geometric minimum value that can be either positive or negative.

3. Area of excavation

Excavation (productive/unproductive):

All research including archaeological excavation. There could be two-dimensional or three-dimensional elements as well as

metric values; those including heights must be expressed as geometric entities.¹¹

4. Area subject to direct restriction

Direct/indirect limit:

Direct archaeological limitation set by decrees, ‘Galassine’,¹² archaeological areas, and parks.¹³ In force for the framework agreement between the archaeological conservation agency of Sardinia and DADU, we proceeded with the experimental data input of the database in order to validate the system.

5. Area subject to different kinds of archaeological restriction

Area subject to other types of archaeological restrictions as they are outlined by regional or local administration. This is a category similar to the previous one, differentiated only by the type of producer of limitation date.

Within these areas, through a traditional approach to archaeological cartography with well-defined topographical elements, the category of archaeological sites and the minimum unit of archaeological evidence identified in the area through direct verification based on a bibliographical trace was introduced by the Sassatelli Committee into the unpublished documentation or in historical cartography.

The Sardinian experiment calls for this level of detail on a regional scale, but we wish to clarify that thanks to the work undertaken in collaboration with the Archaeological Superintendence for monuments and other heritage for the area of Porto Torres, we have a basis of information that allows the representation of the datum up to a single stratigraphic unit (Gottarelli 2011: 103–105).

3 Big producers of Data (E.P.)

The crucial steps for the efficacy of the Spatial Data Infrastructure (SDI) are the categorization by the georeferenced data producers on the island and the establishment of framework agreements for the development of an effective synergy between research and conservation agencies.

It is in this context that the Department of Architecture, Design and Urbanism of Alghero has signed an agreement with the Sardinian Department of Archaeological Heritage, to organize in a systematic way a real collaboration and exchange of information, which represents the starting point for the involvement of other institutional, economic, and social actors.

Fundamental to the structure of the agreement, from a regulatory point of view, is the Italian Legislative Decree no. 32/10 (Implementation of Directive 2007/2/EC) that establishes an Infrastructure for Spatial Information in the European Community (INSPIRE),¹⁴ Legislative Decree no. 82/05 (Digital Administration Code), and Legislative Decree

¹¹ The areas of excavation defined here have been found in the urban area of Porto Torres, starting with a previous project with Nurra and Petrucci (2013).

¹² Law of 8 August 1985, no. 431.

¹³ This item in particular refers to point 81 of the CNIPA repository (National Computer Center for Public Administration).

¹⁴ <http://inspire.ec.europa.eu/>



no. 42/05 (Establishment of the public connectivity system and the international network of the Public Administration), which, pursuant to Article 10 of the law of 29 July 2003, no. 229, applies regulations concerning the obligations for public administrations on the use of digital technologies and the management of databases.

Based on these directives and on the pattern laid down by the Ministerial Committees, the project has set protocols OGC XML, in particular OGC KML,¹⁵ for the technological definition of the minimum metadata of intercommunication — the selection of technological standards of representation, protocols, and syntax that formalize the contents — and storage formats and formats of exchange and communication.

The Framework Agreement constitutes the paradigm of reference for entering into conventions with other agencies; for the use of facilities outside the university for supplementary teaching (Art. 27 DPR 383/80); for consultancy contracts and community projects in partnership; for conducting training activities (summer schools, workshops, seminars) and conferences on topics of common interest.

This path of collaboration based on the sharing of methods and instruments for the maintenance and use of archaeological data between the University of Sassari and The Sardinian Department of Archaeological Heritage, represents a very important step towards the knowledge and conservation of Italian archaeological heritage. The agreement includes duties and responsibilities and establishes the value of the results of the studies. It is based on the principle of ‘best practice’ for the process of unification and standardization between the projects currently undertaken on the national territory, and on the definition of the codices, terminology, and minimum requirements, with the intention of extending it to the widest possible number of subjects.

As mentioned above, the effort to achieve European directives on digital infrastructure, the adoption of Open Source and Open Format tools, as well as the creation of a database are fundamental parts of the Framework agreement.¹⁶

The objective, too long delayed, of the creation of an Italian Archaeological Map,¹⁷ the first and necessary basis for any activity within the field of archaeological heritage, will only be achieved through the breaking down of all of the barriers that until now have limited the ownership of knowledge, areas of influence, and strongholds of competence, from time to time redefined in more or less tacit strategies, the only victim of which has been, and continues to be, the Italian national heritage (Azzena 2004: 191–195).

4 The Maximum Common Divisor (F.N.)

In archaeology, the study and analysis of so-called previous data (current and historical archives; specialist publications; historical, economic, geo-morphological, agronomic data; nature, landscape, etc.), the collection of data from direct analysis (excavations and rescue excavations, data from preventive archaeology, intensive and extensive, systematic

and unsystematic surveys, archaeological censuses and investigations under the surface, etc.), are an abundant but heterogeneous source of information.

Most of these data have a common feature, however, which allows us always to place them in correlation: the position in space and time. The first is characterized by a pair of precise plane coordinates and taken from an altitude; the second, from a more or less precise numeric string. Thanks to this common feature, each item found, appropriately associated with a common Reference System (spatial and chronological), can be mapped.

Its location, in space and time, is the primary condition for the single datum to come into contact with others and with the environment, thus becoming effectively analysed and, at the same time, summarized. To achieve this result, interaction between basic data and geographical databases is essential; these are in their turn representative of multiple themes and variables.

In other words, it is no longer possible to delay the close communion between operational and scientific research institutes, institutions of protection, and the management of the territory, which in any case have begun to produce their own cognitive and projective data, and different cartographic scales also of a historical-cultural and archaeological character. Above all and at all levels, one cannot delay the subsequent sharing of data — a democratization of information that contributes to the creation, definition, and promotion of the awareness essential for the purpose of a shared protection of the cultural heritage, which today has finally been achieved thanks to the contribution of the web.

A minimum amount of knowledge can therefore be derived from the information of the Carandini (2008: 199–207) and Sassatelli (2011: 99–102) Committees.

The attributes, terminology, and common lemmas which define the so-called ‘Greatest Common Divisor’ (Azzena 2011b: 38), must be the long-awaited standard for the treatment of archaeological data, according to the National Archaeological Geographic Information System (SITAN).¹⁸

From a strict geographical point of view, a projected reference system that complies with directives INSPIRE¹⁹ and ISO TC211,²⁰ the UTM-WGS84 zone 32, Northern Hemisphere (EPSG:²¹ 32632), has been chosen. Much of the acquired data in fact used the system of geographical native Roma40, projection ‘Gauss-Boaga’, West zone (EPSG: 3003). The first step was therefore to standardize the data to a single SRS (Spatial Referencing System) through appropriate coordinate transformations and projections.

5 Data Implementation and Constraint Issues (E.P.)

The collaboration with the archaeological Superintendence has set as a necessary starting point the complex issue of archaeological constraints, firstly, because it represents the most pressing and practical problem to be solved for obtaining

¹⁵ www.opengeospatial.org/

¹⁶ See below §8.

¹⁷ For a history of the archaeological cartography of Italy see Castagnoli 1993: 5–81.

¹⁸ See above §3.

¹⁹ <http://inspire.ec.europa.eu/>

²⁰ <http://www.isotc211.org/>

²¹ <http://www.epsg.org/>



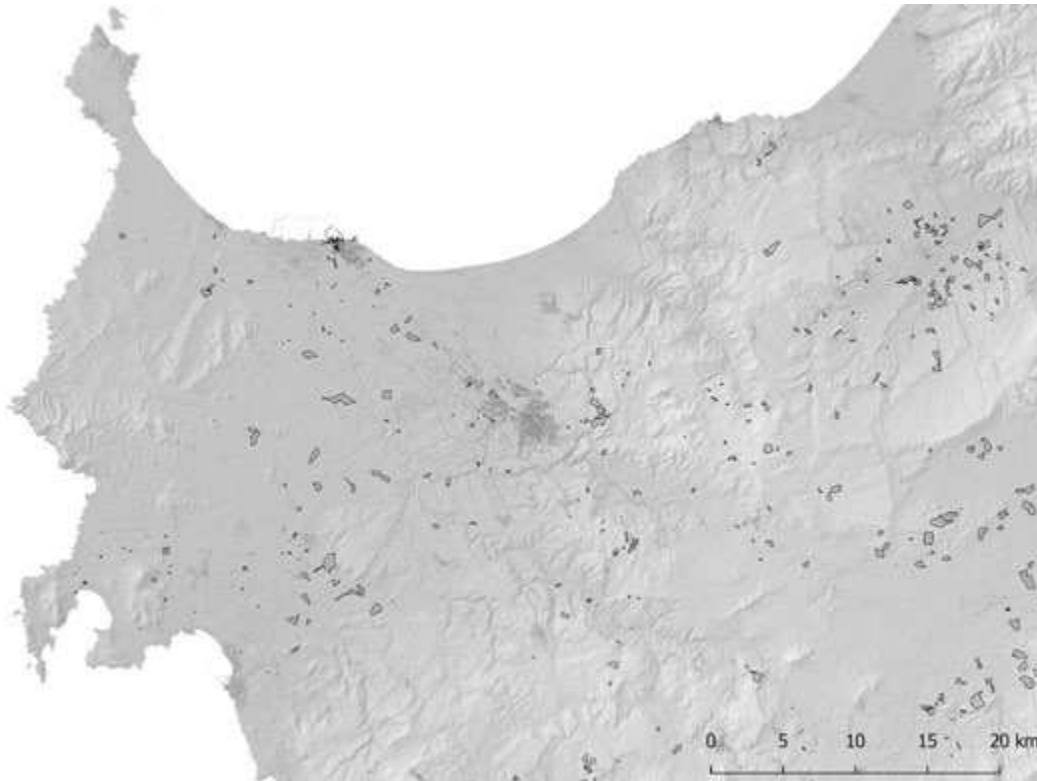


FIG. 2. ARCHAEOLOGICAL CONSTRAINTS IN NORTH-WEST SARDINIA.

knowledge and for the protection of cultural heritage. Secondly, because of the complexity of the subject and for increasing the possibility of experimentation in relation to both the technical and administrative aspects of the management of territory: possibilities for expansion and sharing of knowledge of archaeological heritage, heterogeneity of knowledge at source, awareness and privacy of data, complexity of legal questions, transformation of land and territory, changes of ownership.²²

The opportunity provided by the revision of the Regional Landscape Plan (PPR), was an exceptional field of experimentation. In order to assess, digitize, and georeference 'Identifiers', the implementation of the Geo-DB of the ministerial archaeological constraints of the province of Sassari, in North West Sardinia has been carried out.

The decree of constraint includes: the reference standard; the municipality where the constraint is located; the report on the reasons for imposing it; the cadastral references and, often but not always, a reference for the cartographic register; the minutes of notification to the owners of the cadastral maps affected by the constraint decree and in some cases the note of transcription of the Decree to the Conservatory for the Land Registry. The procedure starts with the breakdown of the document in order to identify all relevant information useful for the acquisition of information elements and their georeferencing.

The operation of geoinformatic acquisition of the constraints area have followed the following procedure:

- Building a GIS Project specifically structured for the needs of implementation of SITAN;
- Use of digital mapping reference (IGM Series 25,²³ CTR RAS,²⁴ Cadastral Sheets and Particles, multitemporal orthophoto);
- Geo-referencing of a cadastral excerpt based on the reference map;
- Construction of a vector layer structured in accordance with the 'Joint Committee for the development and drafting of a project for the construction of the Geographic Information System of the Italian Archaeological Heritage (DM 22 December 2009)';
- Digitization of the extent of the constraint and storage of the same on a PostgreSQL DB Server.²⁵
- More than 1000 archaeological restrictions areas were analysed and digitalized in Central and North Sardinia.

The elaboration of data has shown different kind of issues to be considered:

²³ WMS service: http://wms.pcn.minambiente.it/ogc?map=/ms_ogc/WMS_v1.3/raster/IGM_25000.map

²⁴ WMS service: <http://webgis.regione.sardegna.it/geoserver/raster/ows?service=WMS&request=GetCapabilities>

²⁵ <http://www.postgresql.org/>

²² See below § 7.



- One of the biggest problems is the unavailability of the historical cadastre (register of property) which is linked to the incorrect position set by archaeological restrictions. The modification of properties as a result of sales, inheritance, etc. makes the definition of the restrictions even more difficult. The procedure for access and consultation of the historical cadastre in order to reconstruct the history of a particular property to reach an accurate definition of the archaeological restrictions has been started.
- The progressive subdivision of the property means that in some cases a monument lies completely outside the cadastral maps indicated or is only partially included in it. In other cases, the property indicated in the decree of restriction no longer exists, and an investigation into the historical cadastre is essential.
- In many cases the definition of the restriction on a cadastral basis leads to errors in the definition of the boundaries. They were placed over very extended areas that included the monument as a whole but only in a marginal way, sometimes without regard to the relationship between the environmental conditions and the archaeological potential of the area.
- In other cases, despite the existence of a high number of archaeological elements attested by various studies there are no constraint decrees, which is a very dangerous situation for the archaeological heritage.

The definition of SITAN identifiers is complicated for a variety of problems:

Use and overlapping of different cartographic bases. The cadastre in shape file format provided by the Sardinian local government²⁶ does not correspond with other base maps. This purely technical issue implies a more complex reasoning about the nature and validity of the base maps. If the cadastral boundaries are the references on which is structured the technical and legal appraisal for the demarcation of the restriction, how is one to proceed in the case of an obvious offset of this cartographic base? Who determines which cartographic basis is correct?

Another problem that occurs is the absence of both archaeological and cadastral plans.

In a high number of restriction decrees the number of the property of archaeological interest is indicated only in the report but without any cartographic reference.

In these cases restrictions are defined without a critical analysis of the real situation of the boundary. It is not possible to verify where the temporary boundary is actually located. The absence of toponomastic elements and the impossibility of identifying monuments on an aerial photograph requires us to operate without any kind of reference points in the territory.

6 Protection and land management (R.B.)

The Italian model of management and protection of the cultural heritage is based on some essential elements that specifically

²⁶ <http://www.sardegnaeoportale.it/index.html>

aim at the identification of the archaeological entity²⁷ that has to be protected for the purposes of public use.²⁸

On might query both the conceptual and the operative point of uploading an illogical archaeological map (from instrument to result, starting half way to reach the target.²⁹ There is a need to overcome the idea of an archaeological datum as a single 'object' to protect.

In the constant conflict between the need for protection and conservation of ancient heritage and urban and territorial planning, the 'Sardinia case' shows the limits that various practices currently cannot overcome.

The need to identify and locate in space individual archaeological evidence is inherent in the provision of the law, but by its nature, the graphic sign will only point to an archaeological presence, leaving out the various aspects related to data communication capable of conferring operability to the information obtained from different researches (Azzena 2004: 191).

It is essential that the draft and its subsequent publication is simple and straightforward in order to represent an interpretive and useful step towards the involvement of other specialized skills, properly developed and coordinated.

A synthesis is needed that would put a stop to alleged trivialization of data, and would offer the immediate possibility of defining a meta-language (Azzena, 2004: 195) on which archaeologists, architects, and planners can 'lay the foundations for a project aimed at understanding the patterns of life settlement expanded on it and to promote new forms of sociability rooted in its past and projected into the future' (Tagliagambe 2004: 223–224) (Fig. 3).

7 An ethical goal: Open Source and Open Data (F.N.)

For the acquisition of data of a different cartographic nature we have opted for the use of GIS tools. The choice fell on open source software, in line with the ethical choice of openness behind the whole project.

We chose the software QGIS³⁰ and its plugin, which perfectly meet the needs of digitization required by the project (Gottarelli 2011: 103–5). The data was stored using a DB server PostgreSQL³¹ with a PostGIS³² geographic interface.

²⁷ Starting from the definition provided in Art. 2, paragraph 2 of the Code of Cultural Heritage and Landscape until the 'rhetoric of the ruin'. For this see Choay 1995, Augé 2004, Scarrocchia 2011, and Azzena 2011a. For the relationship between current legislation on archaeological conservation policies see Ulisse 2009, and also Settis 2007, 2010.

²⁸ In reference to Legislative Decree no. 42/04, Art. 3, paragraph 1, see Busonera 2013. A clear interpretation of the Italian and, more generally, European model of protection is in Ulisse 2009.

²⁹ '...the archaeological map is the natural basis for all topographical research, but not the purpose of the research' (Mansuelli 1957: 299–301). 'Then it seems appropriate to reiterate that the archaeological map is mainly a cadaster!' (Azzena 2004: 188).

³⁰ <http://www.qgis.org/it/site/>

³¹ <http://www.postgresql.org/>

³² <http://postgis.net/>





FIG. 3. URBAN DEVELOPMENT IN RELATION TO ARCHAEOLOGICAL CONSTRAINTS.

Data acquisition has raised the issue of disclosure, distribution, and use of data. In a first phase it was decided to run the data through the format Keyhole Markup Language (KML), as required by the Sassatelli Committee (2011: 99–102), using the platform of Webmapping Google Maps³³ through its Google Maps Engine (GME),³⁴ commonly used on browsers and compatible with Google Earth.³⁵

Google tools (as well as other large private providers), however, although free, are subject to a license agreement that binds the data to the provider, and therefore do not allow open licenses (such as Creative Commons,³⁶ Open Data License, etc.) and provide no guarantee for the archiving, preservation, distribution, and reuse of data.

The research was therefore directed towards different instruments. Interest has been directed to the community of open web mapping, particularly OpenStreetMap (OSM),³⁷ trying to find an ‘interpretive key’ of the data acquired according to the SITAN standard³⁸ towards a transfer to the OSM format,

through the conversion tools available in the network. To do this the PostGIS database was drawn up through the editing software JOSM,³⁹ implementing the appropriate ‘keys’ and ‘values’ already available⁴⁰ and the necessary topological validation functional to the data entry into the system (Fig. 4).

This structure proved to be capable of identifying the data acquired according to categories already defined by the community: ‘historical: archaeological_site’, ‘historical: ruins’ and ‘historical: heritage’ (with various ‘tags’ and ‘sub-tags’ e.g. ‘Period: ancient_rome’), identifying, for example in the case of archaeological constraints, a ‘boundary: administrative’, or an entity not visible or detectable on the ground but legally present. The strength of the data structure of OSM is constantly evolving and therefore provides endless possibilities for the adaptation and structuring of data (Fig. 5).

In addition, the structure already codified by OSM provides a ‘ready to use’ solution to the old problem of the relationship between archaeological objects and linked data in the network,⁴¹ as the entities of OSM are already structured and defined according to semantics and terminology, using a

³³ <https://www.google.com/maps>

³⁴ <https://mapsengine.google.com/>

³⁵ <https://www.google.com/earth/>

³⁶ <http://creativecommons.org/>

³⁷ <https://www.openstreetmap.org/>

³⁸ See above §3.

³⁹ <https://josm.openstreetmap.de/>

⁴⁰ <http://wiki.openstreetmap.org/wiki/Tags>

⁴¹ i.e. <http://www.ariadne-infrastructure.eu/> and <http://www.europeana.eu/portal/>

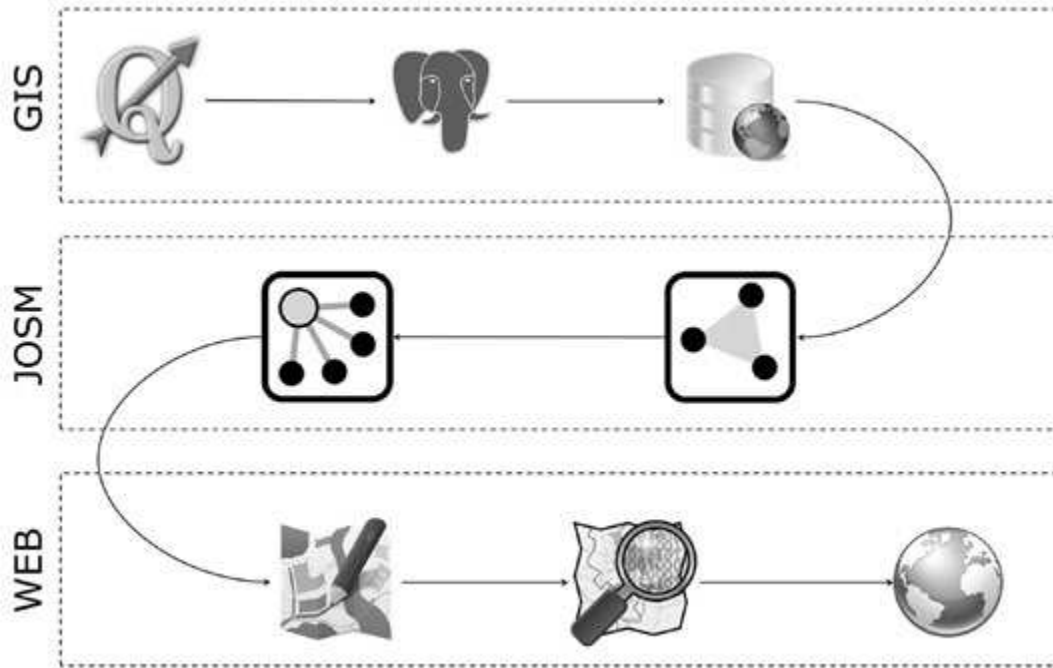


FIG. 4. SCHEMA OF THE ACQUISITION AND PUBLICATION OF ARCHAEOLOGICAL DATA IN THE SITAN PROJECT.

SITAN		OSM	
Code	Value	Key	Value
PAD	Category	historic	archaeological_site
		historic	ruins
		historic	heritage
		boundary	administrative
		historic	user defined
		Tag	Value
OGDN	Name	name	*
DTR	Cronology	historic:civilization	*
DES	Description	site_type	*
		start_date	n
		...	
		tag	user defined

FIG. 5. A PROPOSAL FOR DATA MIGRATION FROM THE SITAN TO THE OSM FORMAT.



standard already prepared for the revolution that is sweeping the web: the web of objects or the semantic web.⁴²

The idea of transferring to OSM also has several precedents: in particular, the transfer of SITAN data arose following recent steps by the Autonomous Region of Sardinia, which offered its open map data for the implementation of the OSM platform.⁴³ As well as the RAS, other administrations at national and international level, such as the French Cadastre office, opted for an open form of spread of information by OSM.⁴⁴

This offers a new scenario regarding to the interchange of archaeological data on a global basis: the possibility that the continuous implementation of a basis of geo-referenced data, even in its minimal form, identifying a ‘Greatest Common Denominator’ of archaeological data⁴⁵ may be valid not only on a national scale, but also on an international one.

8 Conclusions (G.A.)

It is clear that the best and most urgent perspective for a real advancement of this research relates to attempts at the homogenization of an enormous amount of data so far obtained thanks to the collaboration of various public institutions within the region.

In order to have a knowledge base on which to found the necessary investigations on a detailed scale, the homogenization of data is certainly an important starting point and in that sense we must reflect whether the difficulties represent the mark of a consolidated cultural and consequently legislative orientation, from which comes the idea that an informative apparatus dedicated to the ‘historic’ landscape can be interpreted only as ‘site oriented’.

Currently the focus is on traditional protection as well as ‘innovative’, precisely because it is activated by contrasting but rarely coordinated initiatives, which, besides being basically weak and confused, appears to be inadequate to support the actions of the ‘respectful’ planning of historical and archaeological elements in the territory.

A widespread and varied knowledge, extended in this case beyond national borders, is therefore an undoubtedly solid base from which to start; it can be used in different ways and with multiple functions on a continental and global scale.

The international research context, despite the interest shown by the European Union towards the processes of standardization and inter-operability of archaeological data,⁴⁶ does not seem oriented towards the problem of the precise location of archaeological data. This creates great difficulties in the definition of cartographic support on a continental scale.

The transposition of the INSPIRE Directive,⁴⁷ which is able to offer a valuable contribution in this sense, is highlighting the difficulties of implementing the system outside the government bodies involved in the territory and therefore particularly in the field of archaeology.

The European directive for the infrastructure of spatial data is applied, with respect to the infrastructure of data produced by institutions directly related to state or regional authority and consequently, does not affect those who produce cartographic archaeological data outside the bodies of the Ministry (universities, private institutions, etc.).

Reflecting on the possibilities and modalities of data sharing is undoubtedly extremely important, a sine qua non for a real opportunity to spread information and knowledge about local archaeology, but it might be useful to ask whether it is this concept that must be structurally and fundamentally changed even before heading for new frontiers, and thus changed is it misleading because it is still premature, with or without technological support.

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⁴² http://wiki.openstreetmap.org/wiki/OSM_Semantic_Network

⁴³ <http://www.sardegneoportale.it/index.php?xsl=159&ands=267969&andv=2&andc=9166&andt=1>

⁴⁴ http://wiki.openstreetmap.org/wiki/WikiProject_France/Cadastre

⁴⁵ Cfr. §5

⁴⁶ See for example the impact had by the projects EUROPEANA 2015 and Ariadne 2012.

⁴⁷ The INSPIRE (Infrastructure for Spatial Information in Europe) is available in INSPIRE 2004; 2014. About Implementation in archaeology see McKeague et al. 2012 and Corns and Shaw 2010.



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