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SITAR Project: reflections, approaches and methodological roadmaps for a user-based access and web multi-representation of archaeological territorial data

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Premises

There is no scholar in the world, who in order to fully understand the current form of Rome hasn't wished to see it how it once was or to go through its monuments and the other places where the city life used to take place, mostly in its period of great splendour – the Roman age – but also in the times that came before and that followed. In order to give life and concreteness to what may seem just a fantasy, the Project SITAR suggests a study method that will be able to investigate with scientific rigour the evolution of the historical landscape from the first anthropization to our days by using the most upgraded technologies developed in the digital humanities field.
Allow me to say that Rome has probably a bigger responsibility than all the other cities of the world. Not because Rome wants to maintain a Rome-centred vision of history or because, as it is often mistakenly said, Italy has 50% ?, 60% ?, 70% or 80%? of the world heritage monuments (…these are just numbers, for us), but because in Italy there has been a widespread culture of ruins' conservation since the XVI (sixteenth) century.
A long time before the Italian unification of 1861, there were law-constraints in the s.c. *Statuti* for the preservation of ancient monuments.
But it is in 1939 that the first national legislation about heritage landmarks was promulgated. It was an extraordinary law both for the historical context in which it was promulgated and for the modernity and actuality of the principles it instituted.
Although Rome's conservation is extraordinary, the town was not exempted from some of the crucial passages of the post-war urban spread which have deeply marked and in some cases scarred the town.
Many public or private transformations, restorations, change of use, or building of new areas have pierced Rome above or underground, in the historical centre as well as in the suburbs.
In this scenario the Soprintendenza Speciale per i Beni Archeologici di Roma, in acronim SSBAR, guarantees the safeguard of the archaeological heritage of the city and its metropolitan territory and participates, because of its primary function, to the planning and to the architectonical evolution of the urban historical center and the town's suburbs.
This is also the background for the governance of its territory against which the soprintendenza of rome decided to start the project to realize the so called "Sistema Informativo Territoriale Archeologico di Roma", in acronym SITAR.
the SITAR main goal is to develop a system to build the first geographic archaeological information system of Rome.
So the first project aim is to digitize all scientific and administrative data stored in the office paper archives and those produced daily during the actual archaeological and geological researches.
From an operative point of view, we must remember that the archaeological information is very complex: we need to know it, manage it and communicate it.
For these reasons we need all new web-based technologies, possibly open-source, to create well built and flexible information architectures.

The web-applications, like a webGIS for example, guarantee an implementation and quick update of the system functions and they don't require special hardware and software equipments.
For this reason since 2008 the SSBAR launched SITAR, a Project for recording, managing, archiving, using and exchanging archaeological territorial data.
As a project and a system, created and developed by SSBAR itself, SITAR meets the primary needs of the Soprintendenza: study, protection, development and preservation of the exceptionally rich archaeological heritage of Rome.
SITAR main goal is to provide invaluable support in the process of urban co-planning, shared with the other public Administrations.
The SITAR will function as the main information centre and general repository for all the results of the various research projects carried out by all different offices involved in the study and preservation of the archaeological and historical heritage of Rome.
Because of its modular logical architecture, the system is highly adaptable and will allow for inter operability and data ex change with new and up-to-date systems that will become available to the offices working in the territory and also with all Universities or other research institues; this, in turn, will lead to the mutual utilization of the archaeological data and the integrated management of the recorded archaeological resources.
In details, the SITAR is a unique, multi-tasking tool set for the organization of the available scientific and administrative data from the whole of the urban area of Rome.
As an Information System, SITAR brings together many types of data sets, ranging from large monumental contexts to single archaeological features found in rescue excavations done in the territory of Rome.
This is to have uniform archaeological data that might be valuable for public use.
But also the archeological data are important to study and analyse the development and changes of the settled spaces and of the territorial composition of Rome.
It is based on the diachronic reconstruction of all the settlements that have followed one another in the different areas of the city, hence of all the spatial relationships that have developed among the different settled contexts, from the first anthropization to date.
And at the same time it is a way to develop a dynamic cadastre of scientific and administrative information, that responds to the needs of cross-connections between different operational areas of the SSBAR.

SITAR at a glance

The logic of SITAR is based on 5 primary information layers, they correspond to five specific records necessary to implement the database, we WILL try to explain them briefly:
1- the so called ORIGINE DELL'INFORMAZIONE – in English Origin of Information (acronym OI): the administrative and scientific information of every single archaeological digging or geo-physical\geological survey (in others words the sources of information);
2- the s.c. PARTIZIONI ARCHEOLOGICHE in English Archaeological Part (acronym PA): the scientific description of the archaeological findings even if fragmentary, following the chronological or functional criteria; in others words the analysis of information.
3- the s.c. UNITÀ ARCHEOLOGICHE in English Archaeological Unit (acronym UA): : derived by the logical union of MANY 'P.A.s' which ALL together make an archaeological complex (for example: a specific building); in others words the synthesis and interpretations of informations.
4- the s.c. DISPOSITIVI DI VINCOLO (acronim DT): the law-constraints which punctually preserve the important monuments but not their contexts;
5- finally, the s.c. POTENZIALE ARCHEOLOGICO (for now we try to translate it with "*archaeological potential*"): it is generated by the logic union and super-interpretation of the base layers. Local authorities and institutional bodies must bear the 'potenziale archeologico' map in mind when working on the urban development of a territory.

In the SITAR information architecture these primary levels correspond to well structured archives which includes all corresponding spatial dimensions shown in the map of the various features classes.
The SITAR webGis allows an open approach to its many and varied users, an open approach we value as essential to make the SSBAR a provider of data, web applications and web services for Rome archaeology.
The use of the Web, as a tool for publication and circulation of applications to manage the internal relation of informative system components, was an obvious choice.
In this way it is possible to make public a methodological path and to make the administrative and scientific information, available to the SITAR users.
The users can then utilize SITAR data for any future specific processing, according to one's use rights and personal access profile.
One can quickly and easily access a number of applications which will help to dialogue with the archaeological culture of Rome, i.e.: accessing web services of SITAR portal directly from the place of investigation just by an internet connection: all of this will facilitate the procedure of territorial safeguard.
Procedures will consequently be more assertive and immediate due to the technological support.
WebDB and webGIS are the operational interfaces of SITAR database with which any user can interact, contributing at the same time to the implementation of the system through specific web-services on the basis of the increasing solidity of digital archives.
A huge amount of data has been entered until now and just to give an idea of the numbers we have entered more than 10,000 records, more than 2000 scientific papers and more than 12,000
drawings than 10,000 records, more than 2000 scientific papers and more than 12,000 drawings.
On the other hand, it is necessary to code and keep some basic standards up-to-date in order to make new archaeological and administrative data easier to read.
This is the only possibility to guarantee a good level of uniformity and quality for the information daily entered into the SITAR.
For this reason a reference document has been prepared and provided in order to standardize the various descriptive, cartographic and iconographic documents produced by SSBAR consultants.
In an experimental phase, consultants have been asked to use the standards in order to help in the improvement and development of the System as well as in the broader archaeological methodology.
SITAR provides guide-lines to correctly edit documents as showed in the slides attached to this paper.

SITAR and the training activities

Because of the very nature of SITAR and its institutional mission, the procedures involving the implementation and interpretation of data, gathered in current researches, have been entrusted to the SSBAR technical and scientific staff: officers and their assistants; this guarantees a high standardization level of criteria used in the production and acquisition of the excavation record.
At the same time, it guaranties both the correct filing of administrative data and the accurate interpretation of the scientific information.
A primary role has been given to the SSBAR staff: since the early stages those who had the necessary skills have been involved in the Project. Specific training courses have been launched to illustrate the structure and the functions of the system, the data-entry procedures and elaboration of the archaeological data.

The constant interaction between internal staff and external participants, in addition to continuous exchange of questions, answers, doubts and suggestions was extremely useful to test and improve the technical aspects of the system.
The main purpose of SSBAR Staff training is the dissemination of the operative abilities required to improve and use the SITAR.
Moreover, it allowed the validation and the spreading of public data, and the protection of confidential files.
The training for the professionals who already had archaeological or computer knowledge BUT needed to develop SITAR knowledge, was based on a series of individual meetings to demonstrate the structure and operative steps of the System, and to explicate standards for the correct writing of scientific documents for the SSBAR.
The still on-going training, addressed to university students, has a double purpose: on the one hand, it is an important corollary to their archaeological studies that must include a solid knowledge of SDI; on the other hand, it can provide the necessary skills to properly operate in SITAR, in addition to the tools to face excavation protection and exploitation issues of the archaeological heritage.

Future developments

SITAR is beginning to experiment 3D data modeling to create the "first archaeological three-dimensional cadastre" of the city of Rome in order to facilitate a more detailed analysis of the ancient archaeological preserved architecture.
The primary aim of the project is the definition and creation of an en-viron-ment that is 3D-Operational, at least for the modeling and the specific analysis of the basic data; this, in our opinion, will lead to a better and more realistic visualization of the data.
So far SITAR conducted some experiments starting from data made a-vailable by the daily work of implementation; according to two different working procedures:
- modeling 3D data from archaeological and geo-physical investigations. Using the available alti-metrical points, a digital elevation model of the soil has been produced for some ancient chronological phases identified in a sample area;
- reconstruction and rendering of 3-dimensional models of 3 ancient monuments, the *Colombari of the Villa Codini* on the Ancient Appian Road. During the collaboration between the SSBAR and the Indianapolis Museum of Art (IMA), 3D reconstructions of the three funerary buildings have been developed; the volumes of the preserved remains have been integrated with the restored ones through the fragmentation of the information objects into the SITAR logical levels.
Thanks to this experience, it was possible to reflect on how to model and recreate human and geological stratification for the reconstruction of the ancient settlement systems as well as the volumes of the elevation of a single building, in respect of the correlation relationship between PA and UA.
We believe that this is the point on which to reflect in order to reach the hoped "overcoming of the taxonomic level of archaeological territorial knowledge" as Giovanni Azzena said - and to expand the contents of the original concept underlying the archaeological risk map, entering "in the space of relationships, development processes and disposal of urban and territorial systems".
This tool will allow those who are called to collaborate with the institutions responsible for the town planning, to guide the development of a contemporary city that encompasses its historical developments.
It is therefore evident that the process of interpretation needs a clear assumption of responsibility that implies being able to decide, in a conscious way, case by case, if the right to keep what belongs to the past and was brought to light, has to prevail over the new construction, or if the right to exist of what has been designed and is waiting to be made, has to prevail over the old ones.

The information potential of a context, in fact, does not necessarily correspond to its conservative potential.
An example of this, is offered by the large suburban areas in which we find traces of a lively activity for agricultural purposes, these areas - of high scientific value for the reconstruction of the dynamics of ancient populations - show a degree of " conservative potential" definitely lower than areas characterized by the presence of multi-layered monumental contexts.
This does not mean, however, that those tracks which are impossible to physically keep, can not still guide the planning of a contemporary city for example, translating them in an urbanization which recalls the ancient vocation of the territory, perhaps with the design of green areas.

However, because not EVERYTHING can be preserved, we must orientate the choices so as to ensure the protection of those contexts that maintain a certain integrity and that retain the ability to "talk" to the present.
In this context, the aim of SITAR is to transform these material and cultural elements into variables to which a specific value is assigned within a statistical-mathematical calculation, whose result will be able to locate areas to create a predictive map of archaeological potential.
It is a level of information that is currently being conceptually developed, because the start of the trial experimentation requires a long period of data entry, and in a city like Rome this is inevitably a long process, given the amount of information to be processed.
However, it is compulsory to assign a potential value to the discovery, including it within the context of the other known data.
Ultimately the ambition of the SITAR is to be part of the urban and suburban development and, when possible, of the requalification of degraded areas even with the integration of the ancient layout into the social modern one.
It is necessary to cooperate in the planning of the territory: SITAR can represent the junction with people in charge of the administration.
To obtain this result the detail of the represented objects is fundamental, since the accurate description in the maps of the archaeological features outlines the operational basis to set the next and more important stages of data processing and interpretation.

Towards the personalized access of SITAR data and apps

SITAR will be really successful if it will be able to develop some ‘easy’ user interface in which archaeology is explained to a non specialist public.
We must experiment with new ways of communicating inside the geo-social-networking.
The SITAR Project intends also to analyze the current forms of scientific communication and educational programs implemented by SSBAR for the different audiences of its *Museo Nazionale Romano* museal/cultural circuit, to define which lines are most appropriate for the following areas of action and institutional research:
- implementation of communication and collaborative innovative tools, based on technologies of social web, semantic web, open access, e-learning, computational knowledge engines, etc.;
- more effective promotion of the SITAR web platform for scientific facilities, educational and edutainment;
- real guarantee of multiplicity\multidimensional ITC tools and channels in order to open widely the SITAR and the Museo Nazionale Romano system and to benefit different audiences/users.
In order to connect more effectively the different audiences with the information system and the museums and to promote appropriate cultural affiliation through joint actions between all stakeholders concerned, the objectives included in these early design propositions can be so summarized as follows:

1) an up to date study of the relationship between offer and demand of cultural contents and applications in the context of the SITAR and the Museo Nazionale Romano system, necessary to develop the bidirectional link public><museum with appropriate criteria of cultural economy and social geography. The outcomes of these analysis activities can provide the basis for participated cultural planning of new institutional actions of SSBAR in the Archaeological Heritage access *personalization* scenario.
2) Identification and aggregation of the community of practice around the the SITAR and the Museo Nazionale Romano system, through an active outreach to different audiences, such as communication campaigns, congresses, activation of social media dedicated, specific contact with schools and universities, training and update, aiming to the identification of social and occupational categories in which can be recognized the components of the community of archaeological practice.
3) Testing the practice communities and open-learning, through actions such as: joint planning and implementation of technological tools to support (social web sites, social SITAR, web 3.0, e-learning platform, knowledge management systems, monitoring tools, etc.), participated design of multi-level cultural content, participated implementation of Archaeological SDI for the territory fo Rome. In accordance with the philosophy of practice community, the same tools and support work will be an essential object for the testing phase.
4) Design and implementation of "multi-dimensional digital equipment" of the new historical and archaeological cultural contents produced by the SITAR Project. Heritage collections are housed in facilities with an extraordinary historical and artistic monuments that meet the visitor's interest both in terms of exposure of beauty and the charm of historic buildings and prestige. The objective constraints to full freedom in the preparation of collections can make problematic the activation of pathways to knowledge for which you need a physical space much larger, so the lines of action in this regard may concern: wiki-creation of catalogs of entire collections of the Museo Nazionale Romano; historical web mapping; proposition of itineraries designed especially within the logic of communication between peers; ideas competition for the reformulation of museum exhibits physical or virtual.
As remarked in PATCH Call Motivation "*Cultural heritage is a privileged area for personalization research because CH sites are rich in objects and information, far more than the visitor can absorb during the limited time of a single visit. Moreover, the convergence between CH and the Internet has made huge amounts of information about CH readily available in electronic format*".
The two important challenges proposed to be addressed are fully shared also by SITAR Project Workgroup with the common aim "*to provide an engaging experience for the 'digital', 'mobile' and 'traditional' CH visitor before, during and after a visit, by exploiting information from previous interactions on CH sites and elsewhere on the ubiquitous Web*" and to offer a new kind of "*basis for maintaining a lifelong chain of personalized CH experiences, linked to broader lifelong learning*".
These challenges can intersect deeply the general public fascination by the huge amount of geolocalized cultural information that can be retrieved from the web and the social networking, satisfying all the needs to individually assimilate and process public data for new personalized knowledge.
So the new frontier of urban archaeology is also to become a social network able of being again a cultural element of great appeal and able to educate the Citizens in order to share the destiny of our cultural heritage.
We believe that this is the only way to really preserve the historical landscapes because it will be the same people to want it.
Before the end of our contibute, I wish to thank all the People that every day work with us at the SITAR project.

Thank you very much for your attention.