

# Linking Spatial-Temporal Points, Connecting Human and Digital Nodes: the ArcheoSITAR Project Framework

En reliant points spatio-temporels, en connectant nœuds humains et numériques : le cadre du projet ArcheoSITAR

Mirella Serlorenzi<sup>1</sup>, Giorgia Leoni<sup>2</sup>, Ilaria Jovine<sup>2</sup>, Andrea De Tommasi<sup>3</sup>

<sup>1</sup> Director of the ArcheoSITAR Project, Director of the National Museum of Crypta Balbi in Rome, mirella.serlorenzi@beniculturali.it

<sup>2</sup> SITAR Office staff member, giorgia.leoni@beniculturali.it, ilaria.jovine@beniculturali.it

<sup>3</sup> ArcheoSITAR Project system design workgroup member, adt.andrea.detommasi@gmail.com

**RÉSUMÉ.** La Conférence JIAP 2016 a été l'occasion pour le groupe de travail du Projet ArcheoSITAR, de présenter aux collègues français et européens les programmes de la nouvelle phase, en cours, d'amélioration méthodologique et technologique de la plate-forme web collaborative SITAR, à partir des résultats obtenus au cours des huit premières années de mise en œuvre du projet (2008-2016).

À partir du paradigme originaire du SIG institutionnel de la Superintendance Spéciale pour le Colisée et la Zone Archéologique Centrale de Rome – l'institut territorial du Ministère italien du Patrimoine Culturel et du Tourisme, en charge du recensement, de la protection, de l'étude et de la promotion du patrimoine archéologique de Rome –, la plate-forme web SITAR est en train d'évoluer vers un système avancé et participatif d'organisation de la connaissance, au bénéfice de la communauté scientifique et des citoyens. En conséquence, la mise en œuvre actuelle du projet prend aussi en considération de nouvelles approches de en Recherche et Développement concernant la gestion des connaissances archéologiques, l'Archéologie Publique, les Cultural Commons, l'Open et Citizen Science, et la diversité culturelle, la Digital Social Innovation, et la Recherche et l'Innovation Responsable.

Dans ce contexte, le groupe de travail accorde une attention particulière I) à certaines tendances intéressantes d'accès par les utilisateurs aux données en ligne et aux connaissances géo-référencées – tendances qu'il faut encore mieux observer dans le domaine archéologique pour comprendre les besoins réels d'information et les habitudes des utilisateurs - et II) aux demandes d'accès réel, répandu et publique à ces connaissances, surtout à travers des outils coopératifs tels que, entre autres, les applications fondées sur les Open et Linked Data, les archives en Open Data et en Open Access, les Digital Libraries et bientôt, également les Collective Awareness Platforms.

Deux événements fondamentaux ont marqué le projet en termes d'évolution du concept et de finalités primaires (partage des connaissances scientifiques, construction des réseaux de recherche archéologique, engagement du public, ouverture et exhaustivité des données et de la connaissance): dans un premier temps, en 2013, la 3<sup>e</sup> Conférence annuelle SITAR, qui a officiellement lancé la plate-forme web SITAR sur le Réseau Italien de la Recherche et de l'Éducation; puis en 2015, la 4<sup>e</sup> Conférence annuelle SITAR (*Penser en Réseau, Penser au Réseau pour la Recherche, la Sauvegarde et la Promotion du Patrimoine Culturel,* ) qui a effectivement poussé le projet vers sa mission avancée de développement d'un nouveau *lieu social* pour les interactions humaines et professionnelles, pour le secteur archéologique et le contexte social et territorial complexe de Rome.

En considérant ces étapes franchies au cours de la première période de mise en œuvre du projet, ainsi que d'autres expériences stimulantes, telles que le projet européen FP7 ARIADNE et d'autres actions de coopération avec les instituts du Ministère Italien du Patrimoine Culturel et du Tourisme, le Conseil National des Recherches, et certaines Universités italiennes, le groupe de travail du SITAR est en train de développer des composantes plus étendues et performantes pour la plate-forme, tels que le nouveau web Archaeological Information System, en les dotant aussi de procédures coopératives permettant aux utilisateurs d'accéder, utiliser, co-créer, partager et élaborer la connaissance archéologique publique et, par conséquent, de les soutenir dans le développement de leur propre « attitude collaborative ». Dans l'ensemble, ces améliorations conduisent le projet ArcheoSITAR, à partir de l'effort originaire, purement archéologique et technologique, du *Linking Spatial-Temporal Points*, vers la perspective socio-économique plus persistante du *Connecting Human and Digital Nodes*, soit de l'Archéologie Publique, du territoire de Rome.

**ABSTRACT.** The JIAP 2016 Conference has given the opportunity to the ArcheoSITAR Project workgroup to illustrate to French and European Colleagues the plans for the new ongoing season of methodological and technological

enhancement of the SITAR web collaborative platform, starting from results achieved during the first eight years of implementation path (2008-2016).

Moving from the former specific paradigm of institutional GIS of the Special Superintendence for the Colosseum and the Central Archaeological Area of Rome - the territorial institute of the Italian Ministry for Cultural Heritage and Tourism, in charge of the census, protection, study and promotion of the archaeological heritage of Rome, the SITAR web platform is currently evolving towards an advanced and participatory knowledge organization system, for the benefit of both the scientific and citizen community. Consequently, the project implementation is being undertaken also considering new research & development approaches to archaeological knowledge management, Public Archaeology, Cultural Commons, Open and Citizen Science, and Cultural Diversity, Digital Social Innovation, and Responsible Research and Innovation.

In this sense, the ArcheoSITAR Project workgroup is paying a particular attention I) to some interesting trends in users' accessing on-line georeferenced data and knowledge - still to be better observed in the archaeological domain, to understand actual users' informational needs and habits - and II) to requests for a real, ubiquitous and public access to that knowledge, above all by mean of cooperative tools, such as, among the others, Open and Linked Data applications, Open Data and Open Access repositories, Digital Libraries and, soon, also Collective Awareness Platforms.

Two fundamental events have characterized the project in terms of evolving concept and primary scopes (scientific knowledge sharing, archaeological research network building, public engagement, data and knowledge openness and completeness): firstly, in 2013, the third annual SITAR Conference, that has officially launched the SITAR web platform on the Italian National Research and Education Network; later, in 2015, the fourth annual SITAR Conference, entitled *Thinking in Network, Thinking of the Network for Research, Safeguard and Promotion of the Cultural Heritage*, that has actually boosted the project towards its advanced mission of developing a new *social place* of human and professional interactions, for the archaeological sector and for the complex social and territorial context of Rome.

Considering these milestones achieved during the first period of project implementation, as well as some other stimulating experiences, such as, among the others, the FP7 European ARIADNE Project and some cooperation actions with institutes of the Italian Ministry for Cultural Heritage and Tourism, the Italian National Research Council, and some Italian Universities, the SITAR workgroup is currently developing more extended and performing core components for the platform, such as the new web Archaeological Information System, also by supplying them with cooperative procedures to allow users to access, use, co-create, share and elaborate public archaeological knowledge and, therefore, to support them in developing their own *collaborative attitude*. Altogether, these enhancing features are bringing the ArcheoSITAR Project from the former, pure archaeological and technological effort of *Linking Spatial-Temporal Points*, towards the more persistent, socio-economic perspective of *Connecting Human and Digital Nodes*, of both the Public Archaeology and the territory of Rome.

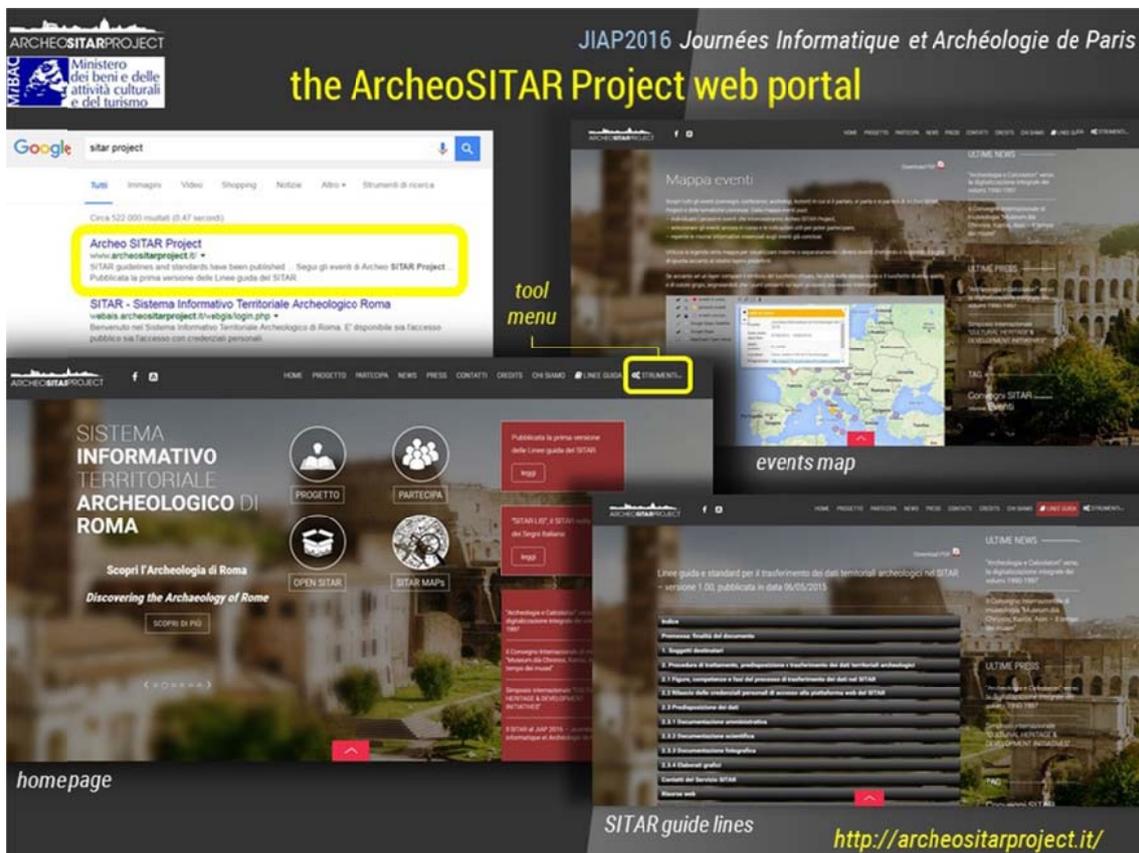
**MOTS-CLÉS.** Connaissance archéologique, Archéologie Publique, Digital Social Innovation, SIG, Rome, plateforme collaborative.

**KEYWORDS.** Archaeological Knowledge, Public Archaeology, Digital Social Innovation, GIS, Rome.

## Introduction

The JIAP 2016 Conference has given the opportunity to the ArcheoSITAR Project workgroup to illustrate to French and European Colleagues the plans for the new ongoing season of methodological and technological enhancement of the SITAR web collaborative platform (in brief, the SITAR), starting from results achieved during the first eight years of implementation path (Serlorenzi & al 2015).

Metaphorically similar to bricks giving form both to structures and architectural appearance of the Institut d'Art et d'Archéologie in Paris (the JIAP 2016 Conference beautiful venue), *packs* of metadata, information and documents assembled through the SITAR informational and technological architecture, constitute a new semantical structure and digital appearance of the complex archaeological knowledge of Rome and its metropolitan territory. It is a very rich informational heritage that, since the 2008, the Special Superintendence for the Colosseum and the Central Archaeological Area of Rome (SSCol) is integrating, re-organizing, publishing, interpolating and disseminating to build, indeed, a solid, innovative and dynamic *cultural architecture* for both local and global community of the Public Archaeology, throughout the SITAR platform (<http://archeositarproject.it/>), as soon as possible available also for other languages' users (fig.1).



**Figure 1.** The ArcheoSITAR Project web portal (credit: MiBACT - SSCol - ArcheoSITAR Project, 2016)

Also the same title of this paper recalls the transition process the SITAR is currently involved in, to widely extend scopes of this pilot initiative of Italian Ministry for Cultural Heritage and Tourism (MiBACT), and to move from the former implementation model towards: I) an advanced and participatory knowledge organization system for Rome and II) new approaches to archaeological knowledge management, Public and Community Archaeology (Richardson & Almansa-Sánchez 2015), Cultural Commons (Cantone, Motta & Marrelli 2014), Open and Citizen Science, and Cultural Diversity (Pozzo & Virgili 2016), Digital Social Innovation (Bellini & al. 2016 : 3-7), and Responsible Research and Innovation (*Rome Declaration* 2014). In this sense, the former scope of the project can be translated in the first part of the paper title, *Linking Spatial-Temporal Points*, and in the meantime, the latter can be identified with the middle part of it, *Connecting Human and Digital Nodes*.

Within the Italian Public Archaeology domain, the ArcheoSITAR Project implementation framework aims to represent a paradigmatic experience to realize an innovative bridge to interconnect those two theoretical, methodological and technological fields, by giving access to all users to an archaeological knowledge progressively re-organized and collaboratively updated, and to support them in developing new, personalized approaches to complex interrelationships between past, present and next future of the urban and territorial social environment.

## 1. The ArcheoSITAR project framework, at a glance: from the concept to first results

The concept of the project refers primarily to:

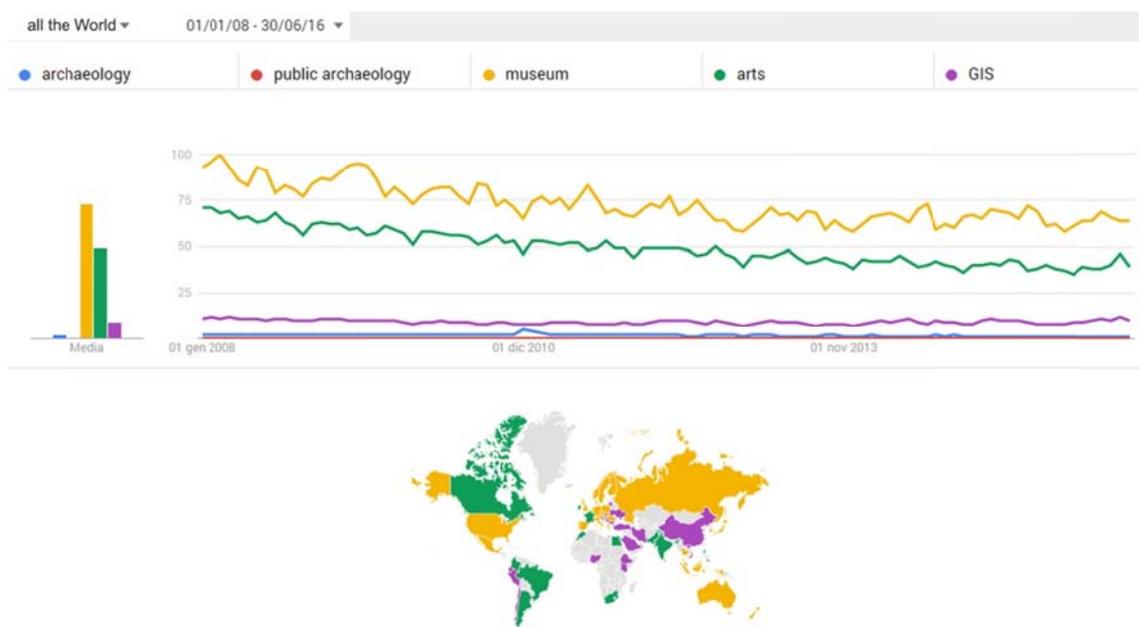
- *bottom-up approach*: the project is an initiative entirely promoted, self-funded and implemented in-house by the SSCol, according to its role of territorial institute of the MiBACT and accountability for the census, protection, study and promotion of the archaeological heritage of Rome, and dissemination of the relevant informational heritage;

– *sustainability*: since the beginning, SSCol has annually granted to its project internal financial resources, to deal with continuous technological development, and data collation and elaboration activities;

– *open knowledge*: the project aims to address some critical needs, particularly: I) the SSCol archive data digitization and systematization, II) the realization of the first *Digital Archaeological Cadastre* of Rome metropolitan territory, and III) the dissemination of archaeological knowledge via a web platform, to grant users an easy and ubiquitous access to it;

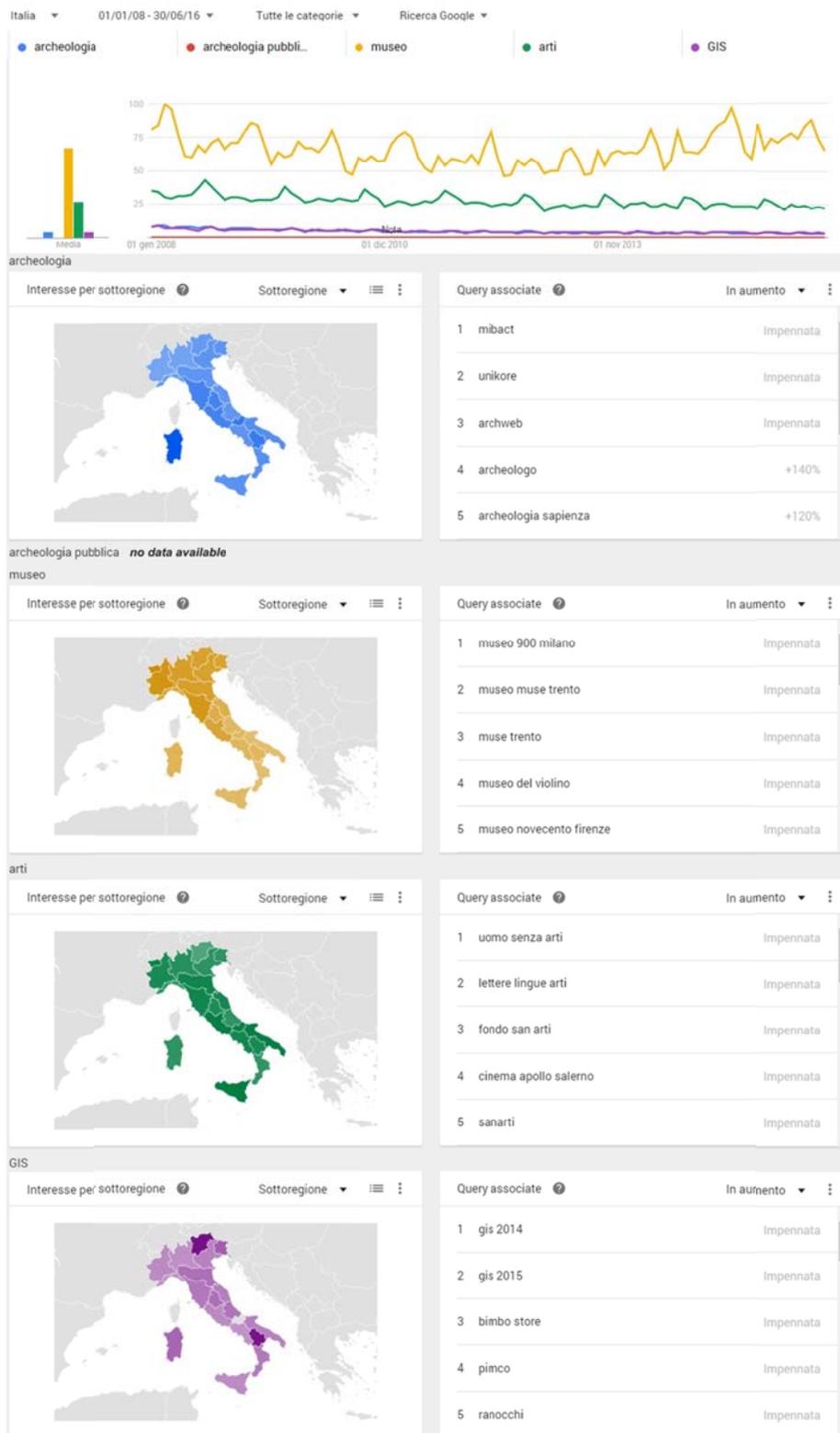
– *cooperation and collaboration*: any innovation effort has been oriented to create a new collaborative *place* for both scientific and citizen community, ever paying attention to users' different informational needs and to individual vs cooperative approaches to knowledge creation and sharing.

The SITAR platform is being implemented also considering some interesting last years' trends in users' accessing on-line georeferenced data and knowledge (See & al. 2016). Some of these trends have still to be better observed in the archaeological domain, to understand actual users' informational needs and habits as *prosumers* of those digital cultural resources, as it has been undertaken for some adjacent research domains, e.g. through analysis of *cultural types* in Smart Cities paradigm (Cantone, Motta & Marrelli 2014), *big data* in social media-based learning environments (Manca, Caviglione & Raffaghelli 2016), and relationships between *Authoritative* and *Volunteered Geographic Information* for spatial planning (Massa & Campagna 2016). An early idea of these phenomena is offered also by popular web analytics if focused on some basic topic searches regarding Digital Cultural Heritage (DCH) themes (fig.2, 3).



**Figure 2.** A screenshot from Google Trends comparing, for all the World, some topic searches regarding CH domain, between 1/1/2008 and 30/06/2016, the time corresponding to the ArcheoSITAR Project first implementation period (credit: Google Trends, 2016; Authors' elaboration)

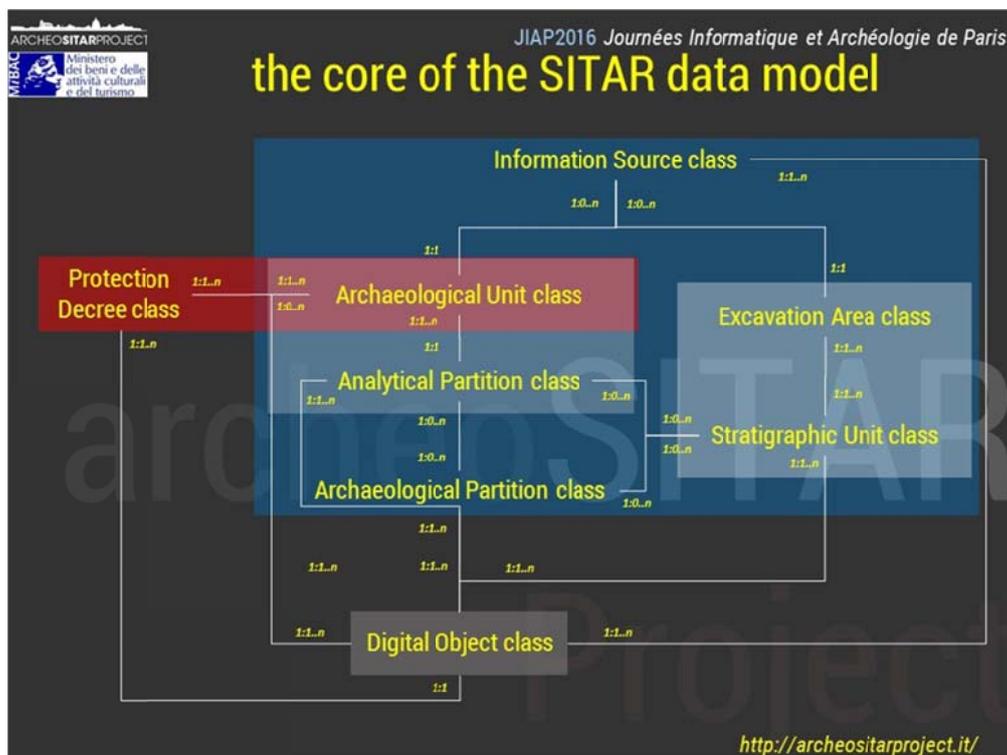
The realization of the SITAR has been entrusted to the internal workgroup composed by archaeologists, both SSCol officers and professionals, GIS experts, archivists and informaticians. Two are the main task areas the workgroup is dealing with: I) design, development and interoperability of the SITAR conceptual and data model, along with the implementation and optimization of the logic and applicative architecture; networking and dedicated digital infrastructure; project dissemination; project funding and governance; and II) data collation, digitization and re-organization within the web platform, starting from scientific and administrative archives of SSCol and some other public archives' resources relevant to the archaeology of Rome.



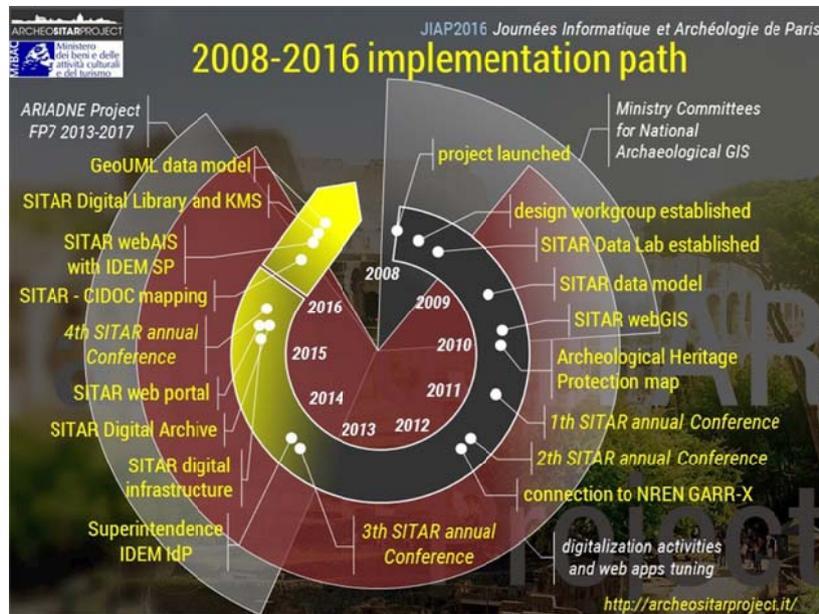
**Figure 3.** A screenshot from Google Trends comparing, for Italy and its regions, some topic searches regarding CH domain, between 1/1/2008 and 30/06/2016 (credit: Google Trends, 2016; Authors' elaboration)

About the former task area, one of the core results is represented by the SITAR model developed upon some fundamental classes and semantical relationships (Serlorenzi & De Tommasi 2011), as schematized in figure 4. This model, continuously evolving, is quite smart, enough robust and further extensible to host spatialized data regarding archaeological and administrative metadata, and digital documents related to them, and it is based on top of the following primary concepts and corresponding classes:

- *Information Source class*: scientific, methodological, administrative and temporal data relevant to each archaeological research, preventive archaeology intervention, geophysical and geological survey, territorial study, monograph research on a single monument, restoration intervention, and similar;
- *Archaeological Partition class*: the scientific description of each archaeological structural finding and stratigraphic macro-evidence, always identified by the binomial of chronological and functional criteria, even if often very fragmentary in terms of their spatial and descriptive extent;
- *Analytical Partition class*: the scientific description of primary functional parts of each archaeological monument or complex, always identified by the binomial of chronological and functional criteria;
- *Archaeological Unit class*: the digital representation - or in other terms *l'instauration*, by paraphrasing the thought of Landivar & al. (2015) - of each archaeological monument or complex, conventionally identified through the logical composition of many fragmentary Archaeological Partitions and/or described through its own Analytical Partitions that, in this sense, characterize the same Archaeological Unit as a *topographic individual* and unique original archaeological context;
- *Protection Decree class*: legal acts issued in last 110 years by the State, according to different laws and practices, to punctually preserve monuments, complexes and portions of territory and landscape;
- *Stratigraphic Unit class*: descriptions of well-known documentation entities related to each archaeological excavation and/or building analysis;
- *Digital Object class*: digital documents (as file/URI, plus metadata, plus a use license) regarding one or many SITAR informational entities;
- *User class*: users registered in the web platform and provided with different roles and data editing permissions.



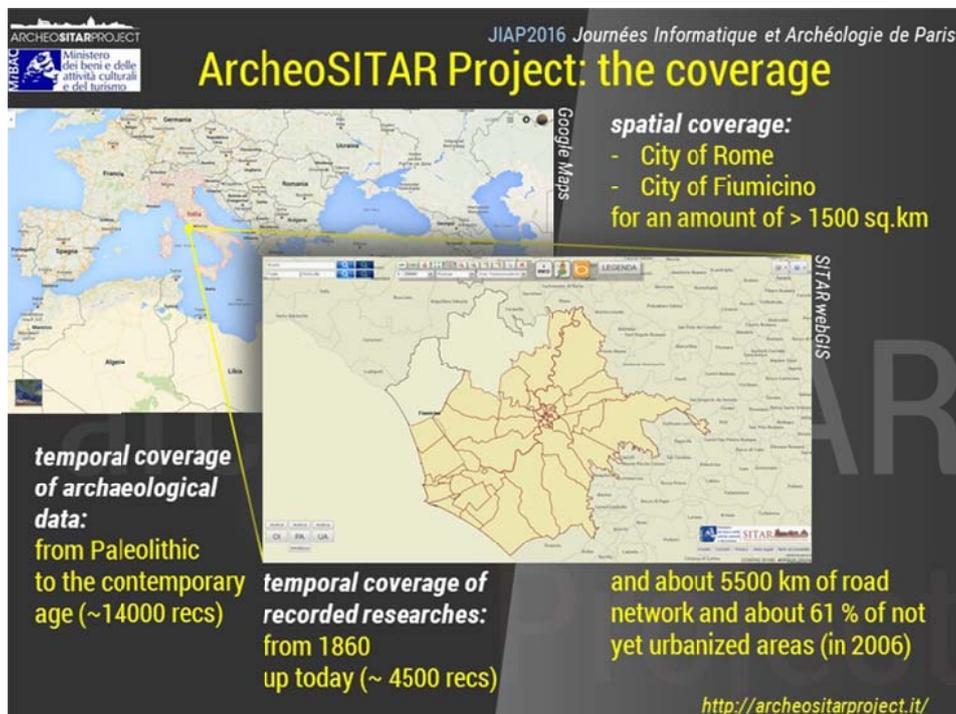
**Figure 4.** The SITAR conceptual and data model (credit: MiBACT - SSCol - ArcheoSITAR Project, 2016)



**Figure 5.** The spatial and temporal coverage of the ArcheoSITAR Project territorial data bank (credit: MiBACT - SSCol - ArcheoSITAR Project, 2016; Google Map, 2016, for the bottom localization box)

About the second task area of the SITAR workgroup, the digitization and data entry activities have been continuously carried out during the first eight years of project and they are currently continuing day by day. At present, the growth of the SITAR data bank can be estimated as about 10 Gb of new data and documents for month, furthermore just referring to the sole internal pool of 10 archaeologist operators. Consequently, as of today, the SITAR offers to users a rich data bank that can be summarized as follows (fig.6):

- the *spatial coverage* corresponds to the most part of the Cities of Rome and Fiumicino (with the primary airport area, near and within which the remains of ancient roman harbours are localized); the total interested area is more than 1500 square kilometers, with an amount of 5500 kilometers of contemporary road network and about 61% (in 2006; data still to be officially updated) of not yet urbanized areas, just to cite some of most relevant infrastructural features;
- the *temporal coverage* refers, on the one hand, to the chronological extent of archaeological data available within SSCol archives and spanning from Paleolithic to contemporary age; on the other hand, it corresponds to the temporal extent of indexed archaeological researches and interventions, currently spanning between 1860 and 2016;
- *features already mapped*: the SITAR geodatabase, growing day by day, contains about: 14.000 archaeological features, 4.500 records of interventions and 40.000 related documents with metadata, meanwhile other 100.000 digital objects are being progressively processed; along with those legacy data, the Cadastre of Archeological Units is growing up and some thousands of descriptive records and archaeological reconstructive plans of monuments and sites are expected to be published in next months through the web platform; furthermore, the SITAR data bank contains also about 730 protection acts issued as regards the historical center and the metropolitan territory of Rome, with relevant administrative documents.



**Figure 6.** The ArcheoSITAR Project implementation path between 2008 and 2016  
 (credit: MiBACT - SSCol - ArcheoSITAR Project, 2016)

## 2. Towards the first decade of ArcheoSITAR Project: the implementation path

The implementation path and primary outcomes of the project can be recalled through the figure 5 and its fundamental steps have been the following:

- 2008 - half of 2009: establishment of both the system design workgroup and the SITAR Data Lab, the latter dedicated to archive documents selection and digitization; design and tuning of the SITAR data model; beginning of data entry activities to populate both the geodatabase and the file system;
- 2010: release of both the first archaeological webGIS and the SITAR *Archeological Heritage Protection web map*; the first annual *SITAR Conference* (Rome, October 2010) illustrated the first two years of project implementation, to public organizations, researchers, academics and final users;
- 2011 - 2012: more visibility, accessibility and performance of the SITAR platform achieved by the dedicated, high performance and optical fiber-based connection to the GARR-X, the National Research and Education Network (NREN) managed in Italy by the Consortium GARR (<http://www.garr.it/b/eng/>); the second annual SITAR Conference (Rome, November 2011) gave the audience an updated about the third year of project implementation;
- 2013: the third annual SITAR Conference (Rome, in May) officially launched the SITAR on the Italian NREN, allowing the enhancement of the primary scope of the project, *Linking Spatial-Temporal Points*, in view of a new and actual interoperability with other public informative systems;
- 2014: the ArcheoSITAR Project joined IDEM, the Italian institutional federation supporting users' digital identity for research, academic and educational sectors (<http://www.idem.garr.it/>); the SSCol Identity Provider activated in view of the federation of SITAR web applications among the IDEM resources;
- 2014 - 2015: released the first SITAR Digital Archive and the web portal; the fourth annual SITAR Conference (Rome, October 2015), entitled *Thinking in Network, Thinking of the Network for Research, Safeguard and Promotion of the Cultural Heritage* (Rome, October 2015), actually boosted the project towards its advanced scope in the Italian Public Archaeology, *Connecting Human and Digital Nodes*; improved digital infrastructure, with geodatabase, web applications and file system

moved to virtual servers onto the NREN, to make SITAR web tools more performing and accessible, and data better safeguarded;

- first half of 2016: conceptual mapping undertaken between SITAR model and the well-known CIDOC-CRM conceptual framework (<http://new.cidoc-crm.org/>), within the context of the European ARIADNE Project, as reported below; it started the development of the new web Archaeological Information System (webAIS) (Serlorenzi & al. 2015) and the Digital Library, as an evolution of the Digital Archive, both expected to be fully accessible at the end of 2016, also through IDEM federation.

On the background of this rather long path, it can be noticed the reference to two important initiatives in which the SITAR workgroup has participated: I) between 2007 and 2010, works of two MiBACT Committees that set out the basic guidelines for a National Archaeological Information System (Serlorenzi & al 2015 : 18); II) from 2013 up today, the ARIADNE Project, being almost completed, within which a research consortium of many European cultural institutions (MiBACT included), research bodies, academies and companies, has intensively worked to implement the first *Advanced Research Infrastructure for Archaeological Database Networking in Europe* (Niccolucci 2014).

### 3. Between human and technological interoperability

To better perform its tasks, the SITAR workgroup is constantly involved in promoting and developing relationships with other *équipes* of Cultural Heritage, ICT, urban and territorial planning sectors, specifically about the interoperability between archaeological and historical information systems, both European and national. This institutional and research & development network has given birth up today to some specific cooperation initiatives, respectively with:

- the Italian National Research Council, specifically the Department of Social Sciences, Humanities and Cultural Heritage (<http://www.dsu.cnr.it/>), to carry out the digitization of the archive of the National Museum of the Early Middle Age in Rome, and to publish it also through the *Science and Technology Digital Library* (<http://stdl.cnr.it/>), a web platform the CNR is implementing for Open Science and Open Knowledge promotion, on the benefit of many cultural and research organizations, and final users;

- the Consortium GARR to enhance the digital infrastructure supporting the SITAR platform and to integrate SITAR web tools with other IDEM federated resources;

- the Central Institute for Unified Catalogue and Libraries (ICCU) of the MiBACT, within the Italian workgroup participating in the mentioned ARIADNE Project, in order I) to supply the European research consortium with some archaeological open dataset and, in the same direction, II) to conceptually map - with the support of the Department of Computer Science of the University of Verona - the SITAR model, the CIDOC-CRM framework and its recent specification *CRM-Archaeo* (<http://new.cidoc-crm.org/crmarchaeo/>), the latter dedicated to the formalization of archaeological excavation data and information; technical documents and first test datasets in RDF format are going to be published on the SITAR web portal;

- the Department of Humanities, History and Archaeology, and the same one of Computer Science of the University of Verona, to develop a new common databank *open schema* that could be suitable for all Italian cities and regions, and their archaeological heritage, starting from the SITAR model transposed into a new semantical specification, according to the GeoUML formalization standard; similarly to the mapping SITAR - CIDOC-CRM, the relevant technical documents are going to be published on the SITAR web portal;

- the State Central Archive of Rome to completely digitize the so-called *Archive Gatti*, containing a rich amount of data produced and collected, during a long time of archaeological excavations in Rome (end of XIX century - 1930s), by Giuseppe, Edoardo e Guglielmo Gatti, as archaeologist officers in charge of documenting and safeguarding the huge archaeological heritage emerging in those decades

due to City rapid evolutions, also on the benefit of the completion of the archaeological map of Rome (Serlorenzi & al. 2015).

Other institutional cooperation initiatives are going on to enrich the informational heritage progressively re-integrated, published and made accessible through the SITAR, such as official interchange of OGC-compliant web services. This is the recent case regarding WMS of the *SIG of Rome in the XVIII century*, based upon the well-known map *La Nuova Topografia di Roma* printed in 1748 by Giambattista Nolli, and analyzed, digitized and transposed into a webGIS by the CROMA research center of the University of Roma Tre (Lelo & Travaglini 2013). Vice versa, the CROMA SIG platform is going to publish all primary SITAR WMS, in the sign of a real interoperability both between projects' team and systems.

#### 4. Ideas and development plans for the new season of the ArcheoSITAR Project

Reflecting on the next future of the project and recalling the real sense of *Connecting Human and Digital Nodes*, it is enough clear that ongoing innovation efforts should be focused on contributing to build new *roads* to better connect Public Archaeology, Cultural Commons, Open and Citizen Science, Cultural Diversity and Digital Social Innovation, that one could represent in a community *ideal map* as some adjacent, not yet fully communicating urban squares. These new *social places*, among many others within which the Social Innovation is expressing itself (Bellini et al. 2016; Pozzo & Virgili 2016), could be effectively interconnected also through archaeological knowledge domain, furthermore representing a *boulevard* directly/indirectly linking these *social squares*, on the one hand, and research & development initiatives, being the latter similar to urban city blocks of this ideal scenario.

The ArcheoSITAR Project is moving towards the actual completion of its public collaborative platform, enhancing some cooperative procedures already implemented and integrating some new ones, specifically oriented to crowdsourcing and *prosuming* of new data and knowledge by users. In this sense, it results fundamental to issue, share and continuously optimize some methodological tools to support users in their different access, use and enrichment of the SITAR, starting from the first *SITAR Guidelines* recently issued to improve production, collation and transferring of new field research data into the SITAR data bank. Following this approach, the workgroup is preparing also guidelines for user-created resources uploading, sharing and disseminating through SITAR platform, including specific open licenses, as soon as possible available also in multilingual version.

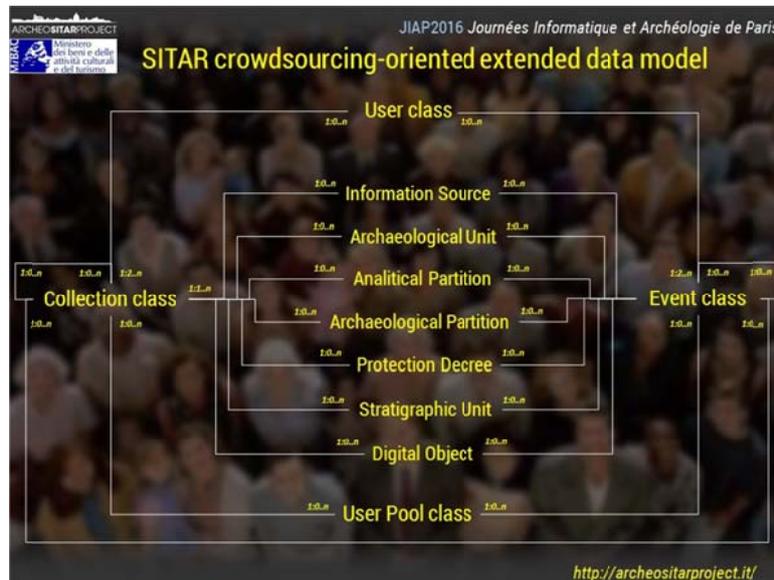
The extension of the conceptual and data model represents an important task within this new ongoing season of innovation, to better address completeness and openness in data collation and dissemination, and, as soon as possible, also peer-reviewing processes of them. The new following classes have been dedicated to the systematization, sharing, publishing and updating of new user-created digital resources (fig.7):

- *collection class* allows all users logged-in the platform to I) make multiple upload of digital resources and metadata referenced to one or many official informative entities, and II) freely share them with other users, ever maintaining those resources well distinguished from official ones, on the benefit of both the SSCol and final users;

- *event class* allows all logged-in users to describe different kinds of events of archaeological interest, such as an entire research work and its progress, or programs and resources of conferences, and so on, ever by uploading public on-line and/or user' own local resources; both collections and events may recall other collections and events, with the aim to create supplementary metadata and semantical extension of knowledge regarding each archaeological context described and shared;

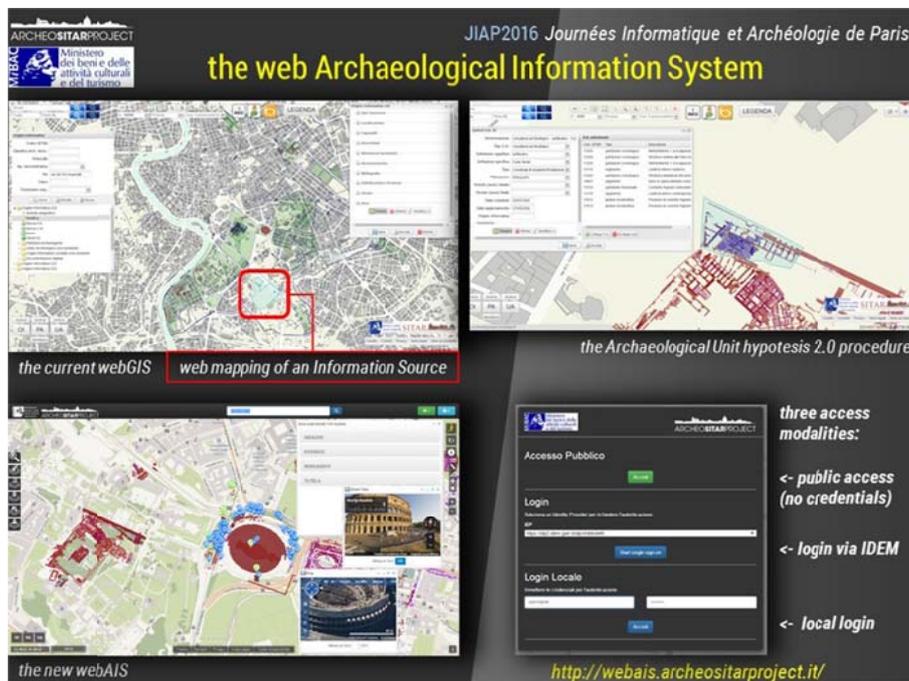
- *user pool class* allows all logged-in users to create and manage different users' groups, acting and discussing around one or many SITAR informational entities and/or related user-created resources,

identification and description of monuments and complexes, archaeological events, or single archive documents.



**Figure 7.** The crowdsourcing-oriented SITAR extended conceptual and data model (credit: MiBACT - SSCol - ArcheoSITAR Project, 2016)

Another very important innovation effort regards the optimization of the web application dedicated both to data editing and dissemination. Ever keeping in mind the user-centered approach of ArcheoSITAR Project, the system design workgroup is dealing with ergonomics and usability of user interfaces, starting from the webAIS (<http://webais.archeositarproject.it/>). Within that application, a new technological paradigm based on GeoServer, Java Spring and Open Layers, and on some inspirations to most popular web mapping platform, will offer to users a new and more friendly environment to explore, share, edit and recombine SITAR data, upon different public base map layers (fig.8). Other promising features are those ones oriented to the cooperative creation of new data and knowledge, upon the official SITAR data bank, such as the *Archaeological Unit hypothesis 2.0 procedure*, already implemented in 2013 and now being improved to allow all logged-in users to I) cooperate in mapping and identifying new Archaeological Units, starting from official SITAR Archaeological Partitions, and II) create new personalized hypothesis of the original extension of each archaeological context. In this sense, the new webAIS is oriented to not be simply «un énième “support” d’information et de communication», but rather «un “matériau” nouveau [...] ayant une “potentialité” [...] créative totale [...], un “dispositif de désignation” [...], un dispositif d’*instauration*», by paraphrasing above-mentioned thought of Landivar & al. (2015) about the implications in trying to «cartographier l’ontologie d’un territoire sur le web».



**Figure 8.** The current webAIS user interface and the evolving new one, with the triple way to log-in (credit: MiBACT - SSCol - ArcheoSITAR Project, 2016)

Similar enhancements are interesting the other web application, such as:

- the *Stratigraphic Unit module* (<http://modus.archeositarproject.it/>);
- the *Archaeological Heritage Protection environment* (<http://webais.archeositarproject.it/tutela/>), to manage and publish protection acts and relevant dataset;
- the *Digital Library*, based on the Apache Jackrabbit framework and supplied both with typical functions of upload/download, editing data/metadata, licensing and digital rights management, and similar, and more advanced tagging and cooperative tools;
- the *Knowledge Management System module*, for engaging publics in new digital resources, collections and events creation, and to allow users to access archaeological knowledge re-organized within the SITAR platform, share it and personally elaborate new *knowledge packs* upon it, on the benefit of the entire, growing SITAR community.

## 5. Cooperative vs collaborative approaches in SITAR

About knowledge creation and sharing, a double paradigm is underpinning the SITAR concept: the cooperative approach and the *collaborative attitude*. By paraphrasing to the incisive definitions of cooperative and collaborative interactive learning offered by Panitz (1999), we may refer them to the double scopes characterizing our project: I) to implement the Digital Archaeological Cadastre of Rome and maintain it through a really cooperative environment; II) to develop the SITAR public platform as a new social place within which users cannot only share, disseminate and enhance knowledge, but, above all, they have to be supported in developing that collaborative personal attitude, indeed, that Panitz clearly defined as «a *philosophy of interaction* and personal lifestyle where individuals are responsible for their actions, including learning and respect the abilities and contributions of their peers». In other words: the building of a *long-term common memory*, on the benefit of archaeological knowledge transmission, can be directed by public cultural organizations, but it should be constantly based on open and cooperative approaches; meanwhile, the collaborative attitude has to be stimulated in users to help them in improving a personalized relationship to both access, and individual and collective elaboration of knowledge, within their own «interpretative or knowledge communities», to use the words of Brufee, cited by Panitz himself.

## Open conclusions

Considering all mentioned conceptual references and innovation topics of the ArcheoSITAR Project, the idea is to develop in next times a more extended and performing collaborative system, possibly within the framework of *Collective Awareness Platform for Sustainability and Social Innovation* (Bellini et al. 2016), about which the European Community has recently launched a new specific call. Specifically, next efforts will be focused on implementing a first *geo-CAPS for Public Archeology*, hoping to possibly share its realization path within new possible institutional partnerships.

Regarding all these themes, the ArcheoSITAR workgroup is continuing to expand these perspectives of research and development, willing to contribute, also through the archaeological discipline, to Responsible Research and Social Innovation processes going on in Rome and in Italy.

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