v003 (last revised 25.06.2015)

Vittorio Fronza

OpenArcheo2 WebGIS

Ontology (Logical model)

Introductory notes

As a premise it is important to note that, as already explained for the conceptual model and in the requirements analysis, we tried to always keep a high level of abstraction (implying a description of all primary objects mainly in terms of interpretation and not only of physical features).
This allows the researcher to master the complexity of the informative plans by dividing the space he studies into its characterizing material components and, at the same time, it facilitates a consultation of the platform by a wider and non-specialists public.

Following our research interests, and in order to be as general as possible, the higher level modeling for the OpenArcheo2 webGIS has stemmed from the concept of **Landscape**, understood as a portion of land formed in time by the man/environment interaction.
Landscapes are represented in their space/time coordinates and variables on the basis of all possibly available material evidences studied through the methods of multidisciplinary archaeological field and laboratory research. In this sense, OpenArcheo 2, in its current declination, can be assimilated to some kind of large container of all historical/archaeological information of which we can dispose for a particular landscape, and all the relationships between this informations.
In fact, there is no limitation in the size of a landscape; its extension, as well as its nature, depend directly on the research interests of the project which studies it. So we can have urban landscapes, representing only one city; or landscapes based on historical regions, on an environmental/climatic coherence, on geographic/morphological features, on a particular economic activity, and so on. A landscape does not even have to be continuous in space (for example we could study the landscape of river fishers in Iron Age Europe and in this case it would be a punctiform collection of territories where this kind of economic activity is carried out, with its settlements, its environmental modifications, its functional elements, and so on).

According to the layout of the conceptual model, clearly derived from a perspective tied to archaeology and to the study of material culture, a historical landscape is formed by two

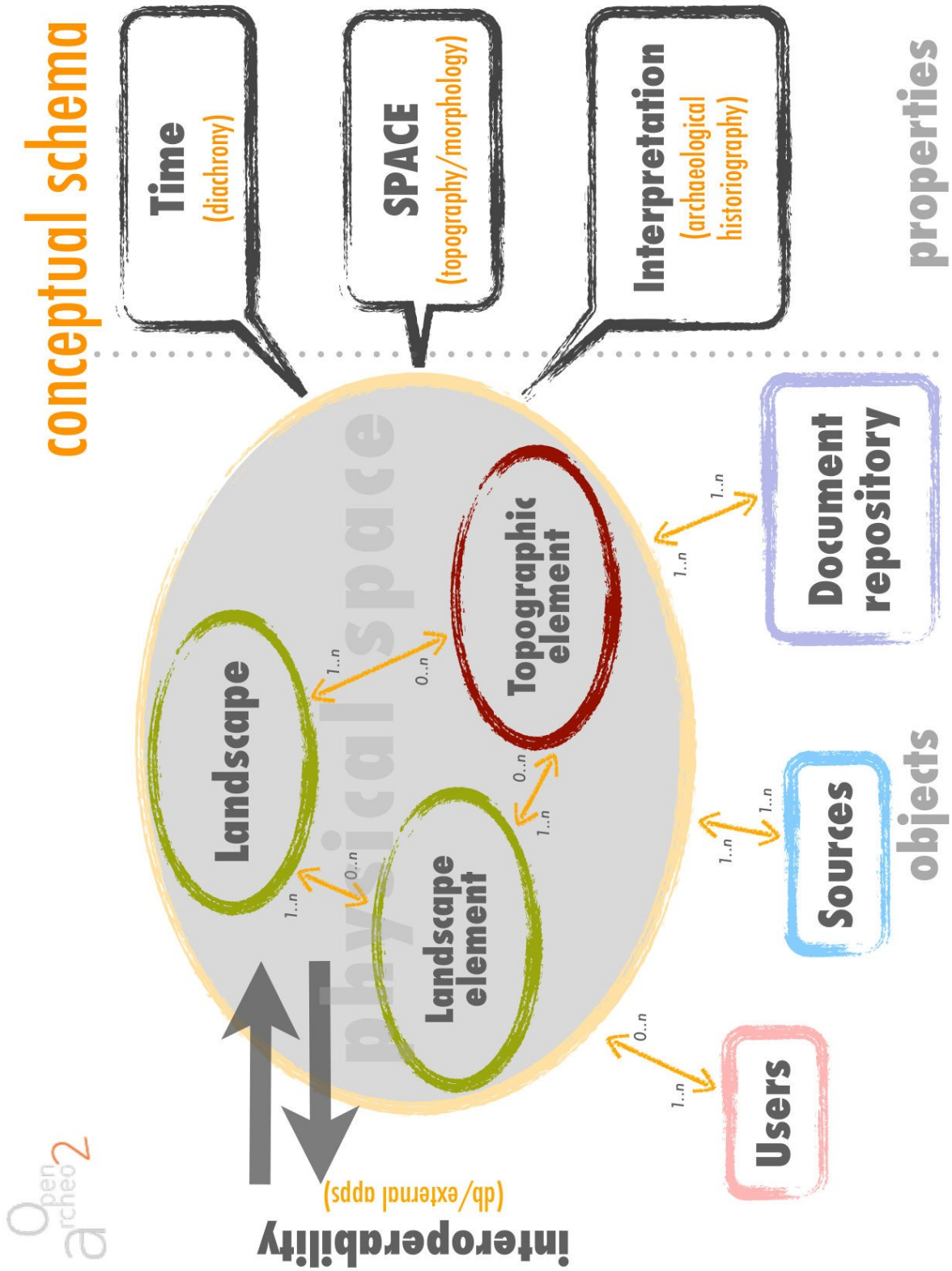
types of objects:

- **Landscape Elements**, to be conceptually understood as the high level (interpreted) parts that form a particular landscape; this means that landscape elements can be, for example, settlements, anthropic exploitations, natural environment, networks of various kinds crossing and marking a territory, etc.

  Ultimately, these objects constitute the diachronic plot of the knowledge we have of a specific landscape, which can be more or less dense depending on the data at our disposal and the possible interpretations of these data. Essentially, a landscape element should respond to the questions: What characterizes a landscape at a given time span? And, in a diachronic perspective, what distinguishes it from the landscapes of another chronological period? How are these elements of the landscape distributed in space? What relationships/interactions exist between them?
- **Topographic Elements**, which represent a lower hierarchical level. They are the components that make up each Landscape Element (e.g., buildings, open spaces, productive activities, roads, fortifications, cemeteries, environmental modifications, etc.), of which we have direct knowledge through any kind of historical sources (but, mainly, material sources). Therefore, they respond to the questions: How is a Landscape Element structured? What distinguishes it from other Landscape Elements, of similar or different type? What synchronic and diachronic patterns are detectable between the Landscape Elements? And which patterns can be identified within a single Landscape Element?

Each one of these three primary objects (Landscape, Landscape Element, Topographic Element) are associated with **three groups of fundamental properties** that describe and specify them: **time, space, archaeological interpretation**.

The spatial data is defined as the location and morphology of an object, including its variants or transformations related both to the chronological factor, as to the existence of different possible interpretations; an object can therefore have more than one spatial representations.



OpenArcheo2. Schema concettuale

The variable "time" represents the diachronic evolution of an object and is expressed through the concept of chronological sequences, phases and ranges.
The set of properties that we have defined as "archaeological interpretation" assumes that, in order to give a meaning to an archaeological material evidence it is not enough to have a coherent spatial and chronological context: it must also be “interesting” in the eyes of the “archaeologist”; in other words, it must implicitly fall into some interpretive grids that reflect the research interests of the scientific community. Also, given the highly abstract and social-oriented approach of the solution, it must be possible to associate multiple meanings to each object.

This last property and the need of giving a “meaning” to the primary objects of the solution, needs to be explained more in detail, In fact, the meanings will be handled in an extremely dynamic way. All primary objects will be "marked" by simple tags and chronotags. In other words, it will be possible to associate to each object a set of easy to understand labels/keywords (tag, to use a well-known word of the web 2.0). The tags can be simple or they can have a chronological variable (thus turning into chronotags).
Tags allow the user to place each object within an interpretive grid. The peculiarity of the system, compared to the traditional and large use of tags on content-driven Internet sites (web 2.0), is that these keywords are gathered in tag sets (sets of keywords) which can be freely created by users. It therefore becomes possible to correlate each object to analytical or descriptive keywords freely conceived by the individual user. Archaeologists, for example, can create their own more or less standardized tag sets reflecting their personal and very specific research interests or that of a scientific community (for example, representing a definition of the settlement type, or of a building type/technique, or reporting the presence of classes of artefacts, or of decorations, and so on).
Such a bottom-up approach encourages the sharing and exchange of ideas and interpretations at various scales (from the single researcher to a small group of research, to the scientific community as a whole). The ability to create custom sets of keywords configures a totally free system in which researchers can create their own interpretative reading tools and possibly share them so that others can make them their own.
The tag sets in use at any given time will reflect, on the whole, the main (research, but not only) interests of the user community; in a sort of natural selection, those most used and

shared survive and continue to replicate, while those more marginal die with the end of the research interest that generated them.
The general public also benefits from this tool, having the opportunity to label the historical and archaeological components of a landscape according to the most diverse criteria (for example, specific selections intended for the creation of thematic cultural tourism routes or defined through spatial criteria like identifying all sites close to a particular place, and so on). This, together with the simplicity of the conceptual model, keeps our platform open to any kind of user target, respecting the Public Archaeology principles and the “socially sharable” requirements we decided to adopt.

The three large sets of properties described so far (space, time, interpretation) make it also possible to carry out analyses on various scales, from the simplest to the most complex; they will concur in forming historiographical models largely based on archaeological sources, which will reflect the societies and economies that have shaped a historic landscape. Some of them will be implemented directly inside the webGIS, while others (more complex ones) will be done through different and more powerful analytical tools after having exported the needed data from the webGIS.

If we want to try to make an example to be applied to the case of Tunis, the Landscape object could be the historical territory of the city of Carthage, made by all diachronical landscape elements which form it; or, in alternative, the Landscape could be intended only as the urban (and, in case, peri-urban) space of Carthage, in which case there will probably be only one landscape element, Carthage itself (or, at the most, a few landscape elements: Carthage and the possible peri-urban scattered sites).
Carthage will anyway be the main landscape element; it is clearly of the type “Settlement – urban settlement” and it will composed by a (high) number of topographic elements of several types derived from the “Topographic element.Type” dictionary (buildings, roads, fortifications, necropolis, etc.).
If there are any decontextualised finds which are important for the understanding of the landscape and, in this case, of the city of Carthage, they can also be added as objects objects of the class “Decontextualised artefact”.
All additional records can be loaded into the repository and attached to the main objects, preserving the possibility of having detailed data of each landscape, landscape element,

topographic element, research project, investigation, etc.

On a more technical basis, instead of producing a typical logical model, which would hardly fit our technological and conceptual choice of adopting a strictly object-oriented approach within a NoSQL database management system (in our case, the Wakanda datastore), we decided to follow a semantic description of the data model rather than more traditional methods such as, for example, the entity-relationship diagram. This means that, in fact, this document is a foundational ontology of the information system, describing its feature and its language in detail.

The first section of this document deals with the ontology itself, while the second section lists all dictionaries used by the object classes.

As said above, the OpenArcheo2 logical model follows an ontological paradigm, based on:

- *Primary object classes (c1)*, representing the main concepts of the information system.
- *Secondary object classes (c2)*, representing conceptually independent entities of the information system that are not primary objects.
- *Service classes (c3)*, representing objects which are used to describe primary and secondary objects but are not in itself relevant within the conceptual model;
- *Reference classes (cref),* used to implement specific properties in the case of references between objects (*n..n* relations).

Each object class is described in a table made of four columns.
The first column contains the **domain class** (that is, the object class itself which is being described).
The second column represents a **predicate** linking the domain class to a **rank class** (property), which occupies the third column.
In the fourth column there is a **logical representation** of the rank class, describing exactly to which class or simple type (string, integer, etc) it belongs to; in alternative this column can refer to particular methods which allow us to obtain a specific property. Particular indications are in brackets, such as the dictionaries associated to the rank class; so, the “type of publication” rank class of the “Bibliographic title” domain class refers to a “single

dictionary lemma" of the dictionary "Bibliographic title.Type of publication", as can be seen in the corresponding fourth column of the table. Another indication contained in brackets is the primary key label ("pk").

Plural and singular forms in the rank class indicate the **cardinality** of the established relationship. For example: "Topographic element *is represented by* spatial object(s)" means that each topographic element has one or more spatial objects which represent it (1..*n* cardinality); on the other hand: "Topographic element *belongs to a* landscape element" means that each topographic element always belongs to one and only one landscape element (*n*..1 cardinality, reflected also by the expression "Landscape element *is composed by* topographic element(s)").
The 0..*n* cardinality is represented by the "can" form of the predicate: thus, "Topographic element *can be described by* tag(s)" expresses the 0..*n* cardinality (topographic element can have from no tags to *n* tags associated to it), while "Topographic element *can have a* name" expresses a 0..1 cardinality (topographic element can have only one name or no name). Finally, complex *n*..*n* relationships are represented as bidirectional 1..*n* relationships; for example: "Landscape Element *has its knowledge built on* source(s)" and "Source *can form the knowledge of* landscape element(s)"; dedicated reference classes, like the typical reference tables used to implement the *n*..*n* cardinality in the relational model, are provided only if there is a need for specific properties (for example, the pages of a bibliographic reference).

The second section lists all **dictionaries** associated to the single rank classes. They can be simple or hierarchical and are presented in English and in Italian language, following the multilingual approach of OpenArcheo 2.
The former are straight lists of lemmas which compose the vocabulary; for example the dictionary "Bibliographic title.Type of publication" is made of the lemmas "Volume", "Paper in miscellaneous volume", "Paper in journal", "Multimedia publication".
The latter are based on two hierarchical levels where primary lemmas are further specified by secondary lemmas (corresponding to different properties/rank classes of the domain class which uses the dictionary). If we look at the primary lemma "Settlement" of the "Landscape element.Definition" dictionary, we can notice that it has the following secondary lemmas: "Simple rural settlement", "Seasonal/temporary rural settlement",

“Complex rural settlement”, “Urban settlement”, “Complex religious place”, “Necropolis”, “Temporary abandonment”. This means that a landscape element could be, for example, a “Settlement: Complex rural settlement” (or, involving other primary lemmas, it could be a “Natural environment – Wetland/Marshland”, an “Anthropic exploitation: Breeding space”, a “Functional element – Hydraulic infrastructure” and so on).

Section 1. Ontology

Primary Object Classes (c1)

Decontextualised artefact	*is identified by an*	id	single integer (pk)
	can have a	name	single string (100 characters)
	is a	definition	single Dictionary lemma (Decontextualised artefact.Definition)
	is located at	main toponym	single Toponym
	is dating to	chronology	single Chronological range
	is represented by	spatial object(s)	collection of Spatial features
	can be part of a	landscape element	single Landscape Element
	can be part of a	topographic element	single Topographic Element
	has a	record stamp	single Record stamp
	can refer to	other project(s)	collection of Projects
	has its knowledge built on	source(s)	collection of Sources
	has a	brief description	single string (2000 characters)
	can be contained by or intersect	spatial repartition(s)	collection of Spatial zones/repartitions
	can be described by	tag(s)	collection of Tags
	can be described by	chronotag(s)	collection of Chronotag refs
	can be further described by	text(s)	collection of Descriptive texts
	can be referenced in	bibliography	collection of Bibliographic titles
	can be represented by	image(s)	collection of Images
	can have attached	repository document(s)	collection of Repo documents
	can have	comment(s)	collection of Comments

Landscape	*is identified by an*	id	single integer (pk)
	has a	name	single string (100 characters)
	covers a	geographic area	single Toponym
	is dating to	chronology	single Chronological range
	is represented by	spatial object(s)	collection of Spatial features
	has a	record stamp	single Record stamp

	can refer to	other project(s)	collection of Projects
	has a	brief description	single string (2000 characters)
	is composed by	landscape element(s)	collection of Landscape elements
	can be contained by or intersect	spatial repartition(s)	collection of Spatial zones/repartitions
	can be described by	tag(s)	collection of Tags
	can be described by	chronotag(s)	collection of Chronotag refs
	can be further described by	text(s)	collection of Descriptive texts
	can be referenced in	bibliography	collection of Bibliographic titles
	can be represented by	image(s)	collection of Images
	can have attached	repository document(s)	collection of Repo documents
	can have	comment(s)	collection of Comments

Landscape element	*is identified by an*	id	single integer (pk)
	has a	name	single string (100 characters)
	is a	primary definition	single Dictionary lemma (Landscape element.Definition)
	specifically is a	secondary definition	single Dictionary lemma (Landscape element.Definition)
	is located at	main toponym	single Toponym
	belongs to	landscape(s)	collection of Landscapes
	is dating to	chronology	single Chronological range
	is represented by	spatial object(s)	collection of Spatial features
	has a	record stamp	single Record stamp
	can refer to	other project(s)	collection of Projects
	has its knowledge built on	source(s)	collection of Sources
	can have	historical toponym(s)	collection of Historical toponyms (historical=true)
	has a	brief description	single string (2000 characters)
	is composed by	topographic elements	collection of Topographic elements

	can be contained by or intersect	spatial repartition(s)	collection of Spatial zones/repartitions
	can include	decontextualised artefact(s)	collection of Decontextualised artefacts
	can be described by	tag(s)	collection of Tags
	can be described by	chronotag(s)	collection of Chronotag refs
	can be further described by	text(s)	collection of Descriptive texts
	can be referenced in	bibliography	collection of Bibliographic titles
	can be represented by	image(s)	collection of Images
	can have attached	repository document(s)	collection of Repo documents
	can have	comment(s)	collection of Comments

Topographic element	*is identified by an*	id	single integer (pk)
	can have a	name	single string (100 characters)
	can have an	acronym	single string (10 characters)
	is a	primary definition	single Dictionary lemma (Topographic element.Definition)
	specifically is a	secondary definition	single Dictionary lemma (Topographic element.Definition)
	belongs to a	landscape element	single Landscape element
	is dating to	chronology	single Chronological range
	is represented by	spatial object(s)	collection of Spatial features
	has a	record stamp	single Record stamp
	can refer to	other project(s)	collection of Projects
	has its knowledge built on	source(s)	collection of Sources
	can have	historical toponym(s)	collection of Historical toponyms (historical=true)
	has a	brief description	single string (2000 characters)
	can include	decontextualised artefact(s)	collection of Decontextualised artefacts
	can be contained by or intersect	spatial repartition(s)	collection of Spatial zones/repartitions

	can be described by	tag(s)	collection of Tags
	can be described by	chronotag(s)	collection of Chronotag refs
	can be further described by	text(s)	collection of Descriptive texts
	can be referenced in	bibliography	collection of Bibliographic titles
	can be represented by	image(s)	collection of Images
	can have attached	repository document(s)	collection of Repo documents
	can have	comment(s)	collection of Comments

Secondary Object Classes (c2)

Bibliographic title	*is identified by an*	id	single integer (pk)
	has a	short reference	single string (100 characters: authors & year)
	has	authors	collection of Persons
	has a	title	single string (200 characters)
	can have a	title integration	single string (200 characters)
	has been published in	year	single date
	is a	type of publication	single Dictionary lemma (Bibliographic title.Type of publication)
	has a	record stamp	single Record stamp
	can have a	brief description	single string (2000 characters)
	can refer to	decontextualised artefact(s)	collection of Decontextualised artefacts
	can refer to	landscape(s)	collection of Landscapes
	can refer to	landscape element(s)	collection of Landscape elements
	can refer to	topographic element(s)	collection of Topographic elements
	can refer to	project(s)	collection of Projects
	can refer to	repository documents(s)	collection of Repository documents
	can refer to	sources(s)	collection of Sources

	can refer to	spatial repartition(s)	collection of Spatial zones/repartitions
	can refer to	toponym(s)	collection of Toponyms
	can refer to	image(s)	collection of Images
	can refer to	investigation(s)	collection of Investigations
	can be described by	tag(s)	collection of Tags
	can be described by	chronotag(s)	collection of Chronotag refs
	can have attached	repository document(s)	collection of Repo documents
	can have	comment(s)	collection of Comments
Bibliographic title: volume	***extends Bibliographic title inheriting all its properties***		
	has authors as	editors	single boolean
	has been published in	publication place	single string (50)
	has been published by	publisher	single string (100 characters)
	can be in	number of volumes	single integer
	can have a	number of edition	single integer
	can belong to a	series	single string (100 characters)
	can have a	series reference	single string (100 characters)
	has	number of pages	single string (20 characters)
Bibliographic title: paper in miscellaneous volume	***extends Bibliographic title inheriting all its properties***		
	is published in	volume	single Bibliographic title: volume
	has a	page range	single string (20)
Bibliographic title: paper in journal	***extends Bibliographic title inheriting all its properties***		
	has authors as	editors	single boolean
	has been published in	journal	single string (100)
	has a	journal number	single string (10 characters)
	can have a	journal issue	single string (10 characters)
	has a	page range	single string (20)

Person	*is identified by an*	id	single integer (pk)
	has a	first/middle name	single string (20 characters)
	has a	last name	single string (20 characters)
	can belong to an	organization	single string (100 characters)
	can be described by a	biography/CV	single string (2000 characters)
	can have	contact information	single string (500 characters)
	has a	record stamp	single Record stamp
	can be author of	bibliographic title(s)	collection of Bibliographic titles

	can be director of	project(s)	collection of Projects
	can be director of	investigation(s)	collection of Investigations
	can be referred to in	producer ref(s)	collection of Producer refs
	can be represented by	image(s)	collection of Images
User	***extends Person inheriting all its properties***		
	has a	username	single string (200 characters)
	has a	password	single string (10 characters)
	can be contacted at	mail address	single string (50 characters)
	belongs to a	user group	single string (100 characters)

Project	*is identified by an*	id	single integer (pk)
	has a	name	single string (100 characters)
	can have an	acronym	single string (10 characters)
	has a	main investigation type	single Dictionary lemma (Project.Investigation type)
	is directed by	person(s)	collection of Persons
	has a	duration	single Chronological range
	has an	actual state	single Dictionary lemma (Generic.Actual state)
	has its research based on a	main investigation	single Investigation
	can have its research based on	other investigation(s)	collection of Investigations
	investigates	source(s)	*Method: show all sources of related investigations*
	investigates	geographic area(s)	*Method: show all toponyms of related investigations*
	investigates	historical period(s)	*Method: show all phases of related investigations*
	is carried out by	participants	*Method: show all producer refs of related investigations*
	has a	record stamp	single Record stamp
	can refer to	other project(s)	collection of Projects
	has a	brief description	single string (2000 characters)
	can study	decontextualised artefact(s)	collection of Decontextualised artefacts
	can study	landscape(s)	collection of Landscapes
	can study	landscape element(s)	collection of Landscape elements

	can study	topographic element(s)	collection of Topographic elements
	can refer to	other project(s)	collection of Projects
	can be the origin project of	record stamp(s)	collection of Record stamps
	can be described by	tag(s)	collection of Tags
	can be described by	chronotag(s)	collection of Chronotag refs
	can be further described by	text(s)	collection of Descriptive texts
	can be referenced in	bibliography	collection of Bibliographic titles
	can be represented by	image(s)	collection of Images
	can have attached	repository document(s)	collection of Repo documents
	can have	comment(s)	collection of Comments

Repository document	*is identified by an*	id	single integer (pk)
	has a	name	single string (100 characters)
	is a	file type	single Dictionary lemma (Repository document.File type)
	is a	document type	single Dictionary lemma (Repository document.Document type)
	is stored in a	file	single blob
	has a	record stamp	single Record stamp
	can have a	brief description	single string (2000 characters)
	can relate to	decontextualised artefact(s)	collection of Decontextualised artefacts
	can relate to	landscape(s)	collection of Landscapes
	can relate to	landscape element(s)	collection of Landscape elements
	can relate to	topographic element(s)	collection of Topographic elements
	can relate to	bibliographic title(s)	collection of Bibliographic titles
	can relate to	project(s)	collection of Projects
	can relate to	source(s)	collection of Sources
	can relate to	spatial repartition(s)	collection of Spatial zones/repartitions

	can relate to	toponym(s)	collection of Toponyms
	can relate to	investigation(s)	collection of Investigations
	can be described by	tag(s)	collection of Tags
	can be described by	chronotag(s)	collection of Chronotag refs
	can have	comment(s)	collection of Comments

Spatial repartition/zone	*is identified by an*	id	single integer (pk)
	has a	name	single string (100 characters)
	can have an	acronym/abbreviation	single string (10 characters)
	is of	type	single Dictionary lemma (Spatial repartition.Type)
	has a	spatial extension	single Spatial feature
	is part of a	set of spatial repartition	single Set of spatial repartitions/zones
	can be related to	investigation(s)	collection of Investigations
	can have a	chronology	single Chronological range
	covers a	chronological range	single Chronological range
	has a	record stamp	single Record stamp
	has a	brief description	single string (2000 characters)
	can spatially contain/intersect	decontextualised artefact(s)	collection of Decontextualised artefacts
	can spatially contain/intersect	landscape(s)	collection of Landscapes
	can spatially contain/intersect	landscape element(s)	collection of Landscape elements
	can spatially contain/intersect	topographic element(s)	collection of Topographic elements
	can spatially contain/intersect	toponym(s)	collection of Toponyms
	can be described by	tag(s)	collection of Tags
	can be described by	chronotag(s)	collection of Chronotag refs
	can be further described by	text(s)	collection of Descriptive texts
	can be referenced in	bibliography	collection of Bibliographic titles

	can be represented by	image(s)	collection of Images
	can have attached	repository document(s)	collection of Repo documents
	can have	comment(s)	collection of Comments

Set of spatial repartitions/zones	*is identified by an*	id	single integer (pk)
	has a	name	single string (100 characters)
	has a	record stamp	single Record stamp
	is	public	single boolean
	can have a	brief description	single string (2000 characters)
	is composed by	spatial repartitions(s)	collection of Spatial repartitions/zones
	can be further described by	text(s)	collection of Descriptive texts
	can have	comment(s)	collection of Comments

Source (information origin)	*is identified by an*	id	single integer (pk)
	has a	name	single string (100 characters)
	can have an	acronym/abbreviation	single string (10 characters)
	is of	type	single Dictionary lemma (Source.Type)
	is produced by a	main producer	single Producer refs
	is the main subject of an	investigation	single Investigations
	can be the subject of	other investigation(s)	collection of Investigations
	can have a	chronology	single Chronological range
	covers a	geographic area	single Toponym
	covers a	chronological range	single Chronological range
	has a	record stamp	single Record stamp
	can refer to	project(s)	*Method: show all projects of related investigations*
	has a	brief description	single string (2000 characters)
	can form the knowledge of	decontextualised artefact(s)	collection of Decontextualised artefacts
	can form the knowledge of	landscape element(s)	collection of Landscape elements
	can form the knowledge of	topographic element(s)	collection of Topographic elements

	can form the knowledge of	toponym(s)	collection of Toponyms
	can be related to	other source(s)	collection of SourceRels
	can be described by	tag(s)	collection of Tags
	can be described by	chronotag(s)	collection of Chronotag refs
	can be further described by	text(s)	collection of Descriptive texts
	can be referenced in	bibliography	collection of Bibliographic titles
	can be represented by	image(s)	collection of Images
	can have attached	repository document(s)	collection of Repo documents
	can have	comment(s)	collection of Comments

Toponym	*is identified by an*	id	single integer (pk)
	has a	name	single string (100 characters)
	is a	definition	single Dictionary lemma (Toponym.Definition)
	is an	administrative toponym	single boolean
	is a	historical toponym	single boolean
	is represented by	spatial object(s)	collection of Spatial features
	has a	record stamp	single Record stamp
	has a	brief description	single string (2000 characters)
	has a relation with	other toponym(s)	collection of ToponymRels
	can have a	brief description	single string (2000 characters)
	can be the site of	decontextualised artefact(s)	collection of Decontextualised artefacts
	can represent the area of	landscape(s)	collection of Landscapes
	can be the site of	landscape element(s)	collection of Landscape elements
	can be the site of	topographic element(s)	collection of Topographic elements
	can represent the study area of	investigation(s)	collection of Investigations

	can represent the coverage area of	sources(s)	collection of Sources
	can be contained by or intersect	spatial repartition(s)	collection of Spatial zones/repartitions
	can be described by	tag(s)	collection of Tags
	can be described by	chronotag(s)	collection of Chronotag refs
	can be referenced in	bibliography	collection of Bibliographic titles
	can be represented by	image(s)	collection of Images
	can have attached	repository document(s)	collection of Repo documents
Administrative toponym	***extends Toponym inheriting all its properties***		
	is of	type	single Dictionary lemma (Toponym.Admtype)
	can have an	address	single string (200 characters)
	can have a	ZIP code	single string (10 characters)
	can have a	town	single string (100 characters)
	can have a	province/region/state	single string (100 characters)
	has a	nation	single string (100 characters)
Historical toponym	***extends Toponym inheriting all its properties***		
	has its knowledge built on	source(s)	collection of Sources

Section 2. Dictionaries

Bibliographic title.Type of publication	
English	**Italian**
Volume	Volume
Paper in miscellaneous volume	Articolo in miscellanea
Paper in journal	Articolo in periodico
Multimedia publication	Pubblicazione multimediale

Chronological date.Meaning	
English	**Italian**
Century	Secolo
Half century	Mezzo secolo
Third of century	Terzo di secolo
Quarter of century	Quarto di secolo
Decade	Decennio
Year	Anno
Beginning of the century	Inizi secolo
Mid century	Metà secolo
End of the century	Fine secolo

Chronological date.Precision	
English	**Italian**
Undetermined	Non riportata
Precise	Precisa
Approximate	Approssimata
Generic	Generica

Chronological phase.Definition	
English	**Italian**
Historiographical period	Periodo storiografico
Excavation period/phase	Periodo/Fase di scavo
Generic chronological phase	Generica fase cronologica
TO BE COMPLETED	

Chronological sequence.Definition	
English	**Italian**
Historiographical periods	Periodizzazione storiografica
Excavation periods	Periodizzazione di scavo
Specific diachronic sequence	Sequenza diacronica specifica
Generic sequence	Sequenza generica
TO BE COMPLETED	

Decontextualised artefact.Definition	
English	**Italian**
Architectural decoration	Decorazione architettonica
Monument/urban installation	Monumento/installazione urbana
Generic decontextualised artefact	Generico manufatto decontestualizzato
TO BE COMPLETED	

Descriptive text.Definition	
English	**Italian**
Generic description	Descrizione generica
Specific description	Descrizione specifica
Abstract	Abstract
Other text	Altro
TO BE COMPLETED	

Generic.Actual state	
English	**Italian**
Ongoing	In corso
Suspended	Sospeso
Finished	Concluso
Other	Altro
Undetermined	Non determinabile

Generic.Object relationship	
English	**Italian**
Belongs to	Appartiene a
Is part of	È parte di
Contains	Contiene
Generic relationship	Generica relazione
TO BE COMPLETED	

Spatial layer.Geometry	
English	**Italian**
Point	Punto
Polyline	Polilinea
Polygon	Poligono

Image.type	
English	**Italian**
Landscape survey photo	Foto di ricognizione paesaggistica
Archaeological survey photo	Foto di ricognizione archeologica
Excavation photo	Foto di scavo

Aerial photo	Foto aerea
General/panoramic photo	Foto generali/panoramiche
Finds	Reperto
Graphical or 3D reconstruction	Ricostruzione grafica o 3D
Sketch/interpretation	Schizzo/interpretazione
Documentazione grafica	Documentazione grafica
Other	Altro

Landscape element.Definition

English		Italian	
Primary definition	**Secondary definition**	**Definizione primaria**	**Definizione secondaria**
Natural environment	Hydrography	Ambiente naturale	Idrografia
	Woods/Fallow land		Bosco/incolto
	Wetlands/Marshlands		Area palustre
	Environmental destruction		Dissesto ambientale
	Geological element		Elemento geologico
Anthropic network	Settlement/demic network	Rete antropica	Rete demico/insediativa
	Economic/productive network		Rete economico/produttiva
	Cultual/religious network		Rete cultuale/religiosa
	Military/fortifications network		Reti militari/fortificatorie
	Communication network		Reti comunicazione
	Infrastructural network		Rete infrastrutturali
Settlement	Simple rural settlement	Insediamento	Insediamento rurale semplice
	Seasonal/temporary rural settlement		Insediamento rurale stagionale temporaneo
	Complex rural settlement		Insediamento rurale complesso
	Urban settlement		Insediamento urbano
	Complex religious place		Luogo di culto complesso
	Necropolis		Area cimiteriale
	Temporary abandonment		Abbandono temporaneo
Anthropic exploitation	Agricultural space	Sfruttamento antropico	Spazio agricolo
	Breeding space		Spazio allevatizio
	Mining area		Area estrattiva
	Collection/supply area		Spazio di raccolta/approvvigionamento
	Hunting/fishing space		Spazio venatorio o di pesca
Functional element	Transformation/processing productive space	Elemento funzionale	Spazio produttivo di trasformazione/lavorazione
	Commercial space		Spazio commerciale

	Simple religious place		Luogo di culto semplice
	Military/fortification element		Elemento militare/fortificatorio
	Hydraulic infrastructure		Infrastruttura idraulica
	Communication infrastructure		Infrastruttura di comunicazione
	Environmental modification		Sistemazione/modificazione ambientale
	Other functional space		Altro spazio funzionale
Planning	Territorial planning	Pianificazione	Territoriale
	Urban planning		Urbanistica
Undetermined	Undetermined	Non determinabile	n.d.
	Generic natural environment		Generico ambiente naturale
	Generic anthropic presence		Generica frequentazione antropica

Producer ref.Role	
English	**Italian**
Scientific director	Direttore scientifico
Technical director	Direttore tecnico
On field director	Direttore sul campo
Coordinator/supervisor	Coordinatore/supervisor
Project manager	Project manager
Scientific responsibility	Responsabilità scientifica
Technical responsibility	Responsabilità tecnica
Scientific operator	Operatore scientifico
Technical operator	Operatore tecnico
Other	Altro
Undetermined	Indeterminato

Project. Investigation type			
English		**Italian**	
Archaeological field investigation	Aerial photograph interpretation	Indagini archeologiche sul campo	Aerofotointerpretazione
	Analysis of architectures		Studio degli elevati
	Archaeological surveillance		Sorveglianza archeologica
	Archaeological survey plan		Rilievo archeologico
	Core sampling		Carotaggio
	Field survey (non-systematic)		Ricognizione di superficie non sistematica
	Field survey (systematic)		Ricognizione di superficie sistematica

	Geophysics prospection		Prospezione geofisica
	Non-stratigraphic excavation		Recupero/scasso/sterro
	Shovel test		Shovel test/Saggio di scavo
	Stratigraphic excavation (emergency)		Scavo stratigrafico di emergenza
	Stratigraphic excavation (preventive)		Scavo stratigrafico preventivo
	Stratigraphic excavation (programmed)		Scavo stratigrafico programmato
	Stratigraphic excavation (underwater)		Scavo stratigrafico subacqueo
Archaeological laboratory investigation	Archaeometric analysis	Indagini archeologiche in laboratorio	Analisi archeometrica
	Morphotypological study of finds		Studio morfotipologico dei reperti
	Remote sensing		Telerilevamento
Other investigation	Accidental finds/discovery	Altre indagini	Ritrovamento casuale
	History of arts investigation		Studio storico-artistico
	Oral testimony		Notizia orale
	Study of iconographic sources		Studio delle fonti iconografiche
	Study of written sources		Studio delle fonti documentarie
	Other		Altro
	Undetermined		Non determinabile

Repository document.Document type	
English	**Italian**
Scientific report/Grey literature	Relazione scientifica/letteratura grigia
Stratigraphic units list	Elenco US
Stratigraphic units sheets	Schede US
Harris Matrix	Matrix di Harris
Field survey records	Documentazione ricognizione di superficie
Finds inventory/catalog	Inventario/catalogo reperti
Find records	Schede reperti
Quantitative data	Dati Quantitativi
Geospatial layer/feature	Dati geospaziali
Vector drawing	Disegni Vettoriali
Bibliography	Bibliografia
Generic database records/catalog	Generiche schede di database
Generic text	Generico testo
Other document	Altro documento

Repository document.File type	
English	**Italian**

Acrobat PDF (.pdf)
Comma Separated Values (.csv)
Open Document Text (.odt)
Open Document Sheet (.ods)
Plain Text (.txt)
Vector image (.svg, .dxf)
Vector geospatial data (.shp, .gml)
Raster geospatial data (geotiff, gml)

Source.type

English		Italian	
Material source	Stratigraphic deposit	Fonte materiale	Deposito stratigrafico
	Surface material concentration		Concentrazione materiale di superficie
	Remote sensing anomaly		Anomalia da telerilevamento
	Geophysics prospection anomaly		Anomalia da prospezione geofisica
	Decontextualised finds		Reperti decontestualizzati
	Chronotypological study of finds		Studio cronotipologico dei reperti
	Archaeometric data		Dati archeometrici
	Spatial/statistical analysis		Analisi statistico/spaziali
	Other material source		Altra fonte materiale
Written source	Documentary source	Fonte scritta	Fonte documentarie
	Literary source		Fonte letterarie
	Grey literature		Letteratura grigia
	Epigraphic data		Dato epigrafico
	Other written source		Altra fonte scritta
Cartographic source	Cadastre	Fonte cartografica	Catasto
	Historical cartography		Cartografia storica
	Sketch		Schizzo
	Other cartographic source		Altra fonte cartografica
Iconographic source	Painting	Fonte iconografica	Pittura
	Sculpture		Scultura
	Miniature		Miniatura
	Incision		Incisione
	Print		Stampa
	Decoration		Decorazione
	Other iconographic source		Altra fonte iconografica
Photographic source		Fonte fotografica	
Toponymic source		Fonte toponomastica	
Reconstructions	Graphical tables	Ricostruzioni	Tavole grafiche
	3D model		Modellazioni 3D
	Reconstructive model		Plastici
	Full scale reconstruction		Ricostruzione in scala reale

	Other reconstructions		Altre ricostruzioni
Historiographical hypothesis		Ipotesi storiografica	
Other type odf source		Altro tipo di fonte	

Spatial repartition.Type	
English	**Italian**
Generic investigation repartition	Generica ripartizione di ricerca
Excavation area	Area di scavo
Field survey samples	Campione di ricognizione
Generic urban repartition	Generica ripartizione urbana
Actual urban district	Distretto urbano attuale
Historical urban district	Distretto urbano storico
Actual region/area	Regione/comprensorio attuale
Historical region/area	Regione/comprensorio storico
Other repartition	Altra ripartizione

Topographic element.Definition			
English		**Italian**	
Built space	Building	Spazio edificato	Edificio
	Architectural complex		Complesso architettonico
	Other architectural artifact		Altro manufatto architettonico
Open space	Place/Square	Spazio aperto	Piazza/piazzale
	Courtyard		Corte/cortile/aia
	Park/garden		Parco/giardino
	Vegetable garden/field		Orto/campo
	Urban planning		Pianificazione urbanistica
Transportation network	Road network	Viabilità	Stradale
	Waterways network		Fluviale/marittima
	Railroad network		Ferroviaria
Fortification	Defensive walls	Fortificazione	Circuito difensivo
	Fortified complex		Complesso fortificato
	Fortified building		Edificio fortificato
	Morphological element		Elemento morfologico
	Other fortification element		Altro elemento di fortificazione
Necropolis	Necropolis	Area cimiteriale	Necropoli
	Isolated grave(s)		Tomba/tombe
Infrastructure	Hydraulic system	Infrastruttura	Impianto idraulico
	Infrastructure connected with buildings		Infrastruttura connessa a edifici
	Infrastructure connected with transportation network		Infrastruttura connessa alla viabilità/trasporto
	Recreational/sports ground		Impianto sportivo/ricreativo
	Waste disposal infrastructure		Infrastruttura per lo smaltimento rifiuti

	Lighting system infrastructure		Impianto di illuminazione
	Energy/telecommunications infrastructure		Infrastruttura per energia/telecomunicazioni
	Construction yard		Cantiere
Environmental modification	Natural	Modificazione ambientale	Naturale
	Anthropic		Antropica
Artistic, decorative, celebrative elements	Primary/independent	Elementi artistici, decorativi, celebrativi	Primari/indipendenti
	Secondary/dependent		Secondari/dipendenti

Toponym.Definition

English	Italian
Settlement name	Poleonimo
Hydronym (river/canal)	Idronimo (corso d'acqua/canale)
Hydronym (lake/basin)	Idronimo (lago/bacino)
Hydronym (sea)	Idronimo (mare)
Oronym (mountain or mountain system)	Oronimo (rilievo montuoso)
Oronym (hill or hill system)	Oronimo (rilievo collinare)
Coronym (land/region name)	Coronimo
Odonym	Odonimo
Other toponym	Altro toponimo
Generic toponym	Generico toponimo

Toponym.Admtype

English	Italian
Nation	Nazione
State/Region	Stato/regione
Province/County	Provincia/Contea
Municipality	Comune
Other administrative toponym	Altro toponimo amministrativo
Generic administrative toponym	Generico toponimo amministrativo