MINISTERO PER I BENI E LE ATTIVITÀ CULTURALI

SOPRINTENDENZA SPECIALE PER I BENI ARCHEOLOGICI DI ROMA
RESPONSABILE SCIENTIFICO DOTT.SSA MIRELLA SERLORENZI

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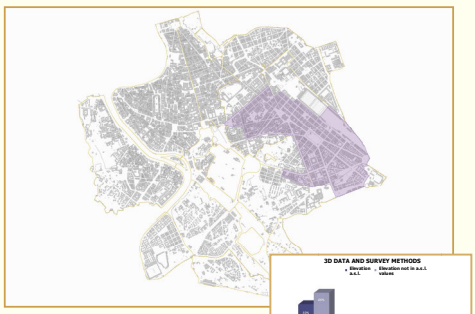
SITAR
SISTEMA INFORMATIVO TERRITORIALE ARCHEOLOGICO DI ROMA

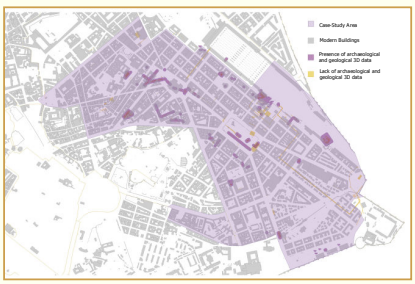
SITAR: 3D DATA FROM ARCHAEOLOGICAL INVESTIGATIONS FOR THE RECONSTRUCTION OF THE SUBSOIL

A number of 3D data storage and processing systems are currently tested within the SITAR Project, under the direction of SSBAR, while at the same time altimetric data capture and systematization around the Esquilino town district (1,960 km^2) are processed.

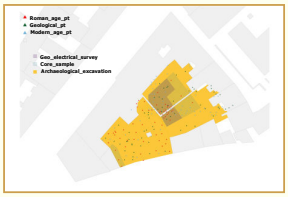


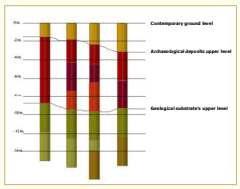
The Esquilino town district in Rome

The urban planning metamorphosis that this very ancient neighborhood went through, as soon as Rome was declared the new capital town of the Italian reign, thoroughly modified its morphological structure, making it the perfect ground for this kind of experiments.
The SITAR GEO–Database stores altimetric data made of dimensioned points, calculated through surveys carried out with Total Station, GPS and geognostic analysis.
In this topographic geo–database, each 3D point is steadily linked to its geological or archeological evidence, thus acquiring all of the descriptive attributes.
Therefore each altimetric point can be sorted through its descriptive, chronologic or type information.



ARCHIVE DATA ACQUISITION AND SELECTION
- Accurate georeferencing
- Informations about chronology and interpretation of layering
- A.s.l. altimetric data

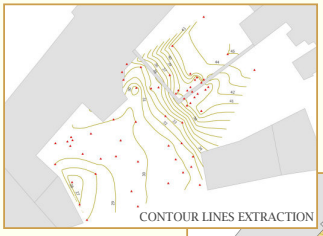




SELECTION OF 3D DATA FROM ARCHEOLOGICAL EXCAVATION SURVEYS

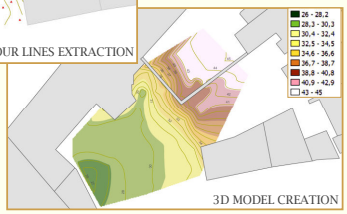
Altimetric points from the topographical surveys:

a) 3D data of layering and anthropic structures, sorted by functional and chronological macrophases
b) Selection of geological substrate's altimetric data



ANALYSIS AND 3D DATA EXTRACTION FROM CORE–SAMPLES

- Altitude a.s.l. of contemporary ground level
- Archaeological deposits upper level
- Geological substrate's upper level

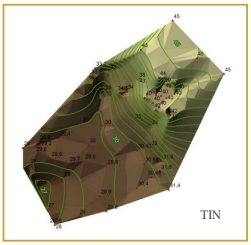


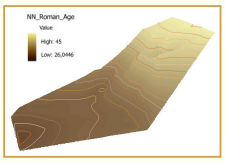
CREATION OF A 3D MODEL OF THE UPPER LEVEL OF EACH CHRONOLOGICAL PHASE
(in the figure the case study's roman age surface)

These records, integrated with up–to–date topographic bases, historical cartography and geological / geo–morphological analysis, can be used to render spatial models describing the territory also under its diachronic variable.

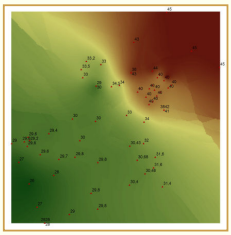
Experimental 3D models creation is carried out distinctly for each area of survey, representing the starting ground to piece together, through interpolation, the surface of any unsurveyed areas.

Within the surface reconstruction process for areas where archaeological data are less homogenous, a relevant role is played by geological *continuous* surface 3D data, based on previous specific analysis, through which data interpolation can be directed and sorted.





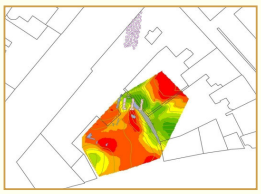
DEM – GRID
(Natural Neighbors Interpolation)



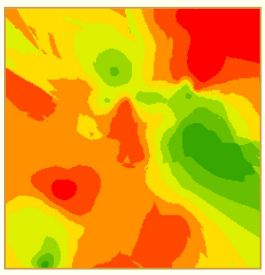
DEM – GRID
(Ordinary Kriging Interpolation)

INTERPOLATION ALGORITHMS EXPERIMENTATION

Experimentation of a method for the surfaces reconstruction and exact interpolation of the areas where archaeological data are less homogenous

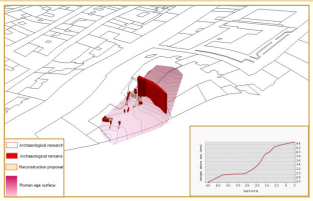


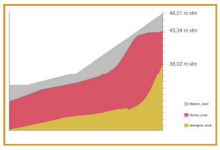
An example of map of archaeological deposit compared with actual ground level

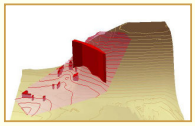


GRIDS SUBTRACTION

Prototype map of archaeological deposit depth compared with actual ground level, for analyzing morphological diachronic variations

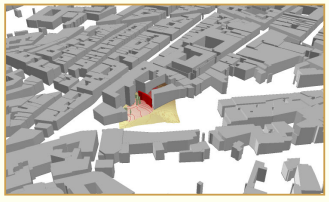






3D RESTITUTION

Roman age structures and surface could be integrated in the actual topography.
From 3D models infinite bi–dimensional sections could be generated along any axis determined by the users



Such a highly accurate 3D database on territorial scale is the ground on which new previsional devices for the Archaeological Potential definition can be tested. Our example relates to the map's prototype of an archaeological deposit compared with actual ground level, starting from which infinite bi–dimensional sections could be generated along any axis, setting up a new helpful tool for urban planning and historical evidences protection.
To this end, the operating standards setup becomes essential, providing for the output of altimetry data full and comprehensive of any relevant morphological variation, made up by an as uniform as possible grid of 3D points a.s.l., and by an overall census of geognostic surveys data.

The SITAR project aims to establish, maintain and develop a real spatial data infrastructure, in line with the guidelines provided by the E.C. in c.d. Directive INSPIRE issued by the European Parliament in 2007.