D16.1 – Mid-term interim report on ARIADNEplus pilots

Version 1 *(final)*

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Project coordinator name, Title and Organisation:	**Prof. Franco Niccolucci, PIN Scrl - Polo Universitario "Città di Prato"**
Tel:	**+39 0574 602578**
E-mail:	**franco.niccolucci@pin.unifi.it**
Project website address:	**www.ariadne-infrastructure.eu**

Authors: **Franco Niccolucci**

                                              PIN

                                              Kai Salas Rossenbach

                                              INRAP

Contributing partners: **Guntram Geser, SRFG**

                                              Valentina Vassallo, CyI

                                              Sorin Hermon, CyI

                                              Amala Marx, INRAP

                                              Benjamin Štular, ZRC-SAZU

                                              Anthony Corns, CARARE

                                              Andres Dobat, AU

                                              Flavia Massara, Sara Di Giorgio, ICCU

                                              Valeria Boi, ICA

                                              Pasquale Pagano, Fabio Sinibaldi, CNR-ISTI

Quality control: **Stephanie Williams, PIN**

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1 Executive Summary

This deliverable describes the activities carried out during the first two years of the ARIADNEplus project within Work Package 16 (WP16) by the different partners and describes the results achieved by this work package.

WP16, titled *Innovative Methods and Pilots*, concerns the preparation of pilots, i.e. exemplary applications of the ARIADNEplus services to be used as demonstrators of the potential of the ARIADNEplus framework. They address specific archaeological research questions and use one or more of the ARIADNEplus services operating on a selected data sample. The list of such pilots and the corresponding WP tasks is provided below. Partners involved are also listed, with the Task leader in bold.

Task 16.1 – Establishing a common framework for the ARIADNEplus pilots. Partners involved: **CYI**, SRFG, INRAP.

Task 16.2 – ARIADNEplus for Airborne-LiDAR data use and reuse. Partners involved: **ZRC-SAZU**, CARARE, CNR-ISTI(VCL).

Task 16.3 – ARIADNEplus for a Historic Environment Spatial Data Infrastructure. Partners involved: **CARARE**, ZRC-SAZU, other ARIADNEplus partners as required.

Task 16.4 – ARIADNEplus for sharing archaeology in 3D. Partners involved: **CYI**, CNR-ISTI(VCL).

Task 16.5 – ARIADNEplus for public/community archaeology. Partners involved: **AU**, UoY-ADS, DANS-KNAW, BUP-DMS, UH.

Task 16.6 – ARIADNEplus for understanding ancient and present cities: scanning the heart of Rome. Partners involved: **MIBACT-ICCU (ICA),** CNR-ISTI(VCL).

Task 16.7 – Exploiting the ARIADNEplus Data Infrastructure to understand complex phenomena of the Past. Partners involved: **UB**, PIN.

Task 16.8 – ARIADNEplus for Preventive Archaeology. Partners involved: **INRAP**, UoY- ADS, USW.

The report starts with a brief introduction to the WP goals and with a section dedicated to Task 16. 1, in charge of preparing a common framework for all the pilots.

Then each pilot is described in a specific section, which details the archaeological issue addressed, including the necessary background; the perspective target users and the planned dissemination; the data to be used; the pilot progress so far; the deviation from the work plan, if any; and the plans for the next period.

2 Introduction and Objectives

The present deliverable reports the progress achieved by ARIADNEplus in the preparation of pilots within WP16. The pilots are exemplary applications of the ARIADNEplus services to specific archaeological research questions, aiming at:

- Defining the innovative methods enabled by ARIADNEplus services for archaeological research communities
- Testing the services and innovative methods in pilots on real use cases
- Demonstrating the advantages of using ARIADNEplus to the archaeological user communities
- Showcasing the ARIADNEplus data and services for building applications for professionals, heritage managers and the public at large.

The project has planned to develop seven pilots, so the WP consists of a coordination task (T16.1), aimed at defining a common framework to design and present the pilots, and seven tasks (T16.2 to T16.8) corresponding to the individual pilots.

As already mentioned, pilots aim at demonstrating in real applications the ARIADNEplus services, described in the ARIADNEplus WP15 work plan and reported in D15.1 "Mid-term interim report on the ARIADNEplus services" and D15.3 "Final report on the ARIADNEplus services". Developing the pilots heavily depends on the service availability but the pilot design may influence the service design and required functionality. Thus, the present report is not only a snapshot on the WP advancement, but also an advance verification of the services based on user requirements, made apparent by the service design, to be feedback to the team in charge of services development.

In general, at present almost all the pilots are at the design stage due to the progress stage of service implementation. Only one is instead well-advanced as it was available before as stand-alone, and the implementation requires only porting it in the ARIADNEplus framework.

To monitor the progress of the work package, an online workshop has been organized on 14 January 2021. All task leaders attended the workshop, coordinated by the project coordinator Franco Niccolucci and by the WP leader Kai Salas Rossenbach. They reported about the progress of their pilot, the issues encountered and the plan for future work in the first semester of 2021. Each task provided in advance a summary report using the template created by Task 16.1 (see next section). The discussion focused on the requirements for the corresponding services, which were grouped and forwarded to the corresponding task teams. In general, the requests correspond to functionalities already existing or planned for implementation. It was also decided to follow closely the service implementation closely and to meet again in June/July to check the progress.

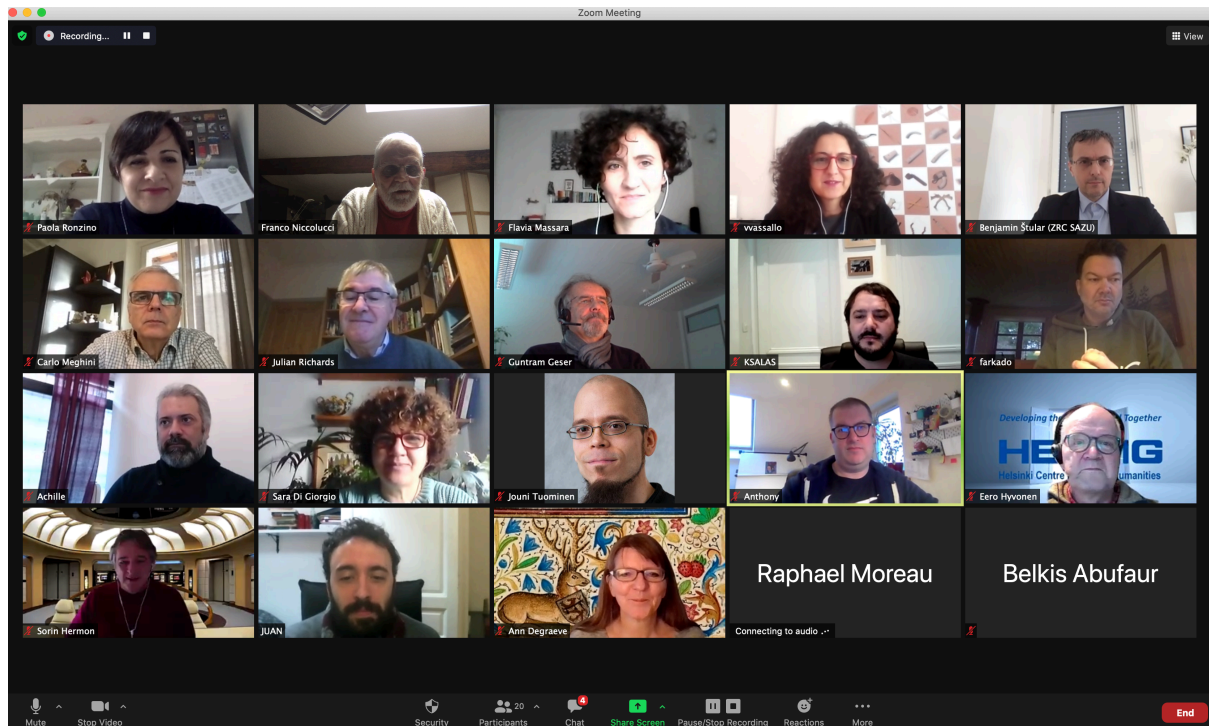The details of this analysis are reported in the Task 16.1 section of the present deliverable.

Figure 1. A snapshot of the WP 16 workshop held online on 14/1/2021

3 Task 16.1 - Establishing a common framework for the ARIADNEplus pilots

3.1 Task description and progress

As already mentioned, Task 16.1 is in charge of the harmonization of the Pilots deployment, establishing a common framework in which they are developed as regards the engagement and mobilisation of the targeted communities, and the description of lessons learned from them. The Task has produced a form to monitor regularly the progress, shown below.

Work Package 16: Innovative Methods and Pilots

Pilot description template

Pilot title:

Proposed by: *[should be partners who would run the pilot, at least 2 partners]*
- o [Partner]
- o [Partner]
- o [Partner]

Brief description:

Description [max. 10 lines]

ARIADNEplus service/s to be used:

[at least one ARIADNEplus service must be used, but not too many; also mention if (a) newly developed in ARIADNEplus or (b) already available and planned to be enhanced; also mention key requirements with regard to implementation and/or use by target group/s]
- o Service [newly developed in ARIADNEplus /or/ already available and planned to be enhanced]
- o Service [newly developed in ARIADNEplus /or/ already available and planned to be enhanced]

Key requirements:

ARIADNEplus data to be (re-)used:

[at least 1 dataset or collection (better more) registered in A+ must be used (otherwise there would be a too weak relation with A+); in addition also one or more external would be good to include, mobilized for inclusion in A+ or linked through Linked Data; also mention key requirements for data (re-)use, e.g. data/set formats, vocabularies, license,...]
- o Data set/collection:
- o Data set/collection:

Key requirements:

External target group/s of the pilot:

[avoid "General public" and address specific target groups, i.e. providers/re-users of scientific data; museums, etc. with a clear potential for uptake]

Target group type (e.g.):
- o Researchers in *[mention domain/s, i.e. art & architecture, bioarchaeology, ...]*
- o Research data managers in *[mention domain/s, if relevant]*
- o CH management, CH practitioners (i.e. museums), …
- o Businesses, i.e. creative industry, tourism, …
- o Citizen scientists
- o Other specific target group

Size (estimate):

Knowledge/skills required by target group for uptake:

Other group characteristics relevant for the pilot:

Figure 2. The template for pilot data collection (page 1)

Figure 3. The template for pilot data collection (page 2)

The details of each report, integrated by the workshop presentation, are described in the following sections, each one dedicated to a task.

The relationship between pilots and services are summarized in the table below.

Task	Title	Main related service(s)
T16.2	ARIADNEplus for airborne-LiDAR data use and reuse	Cloud geo-server (T15.7) Visual services (T15.1)
T16.3	ARIADNEplus for a historic environment spatial data Infrastructure	Cloud geo-server (T15.7)
T16.4	ARIADNEplus for sharing archaeology in 3D	Visual services (T15.1)
T16.5	ARIADNEplus for public/community archaeology	Query services (T15.5) Visual services (T15.1)
T16.6	ARIADNEplus for understanding ancient and present cities: scanning the heart of Rome	Cloud geo-server (T15.7)
T16.7	Exploiting the ARIADNEplus Data Infrastructure to understand complex phenomena of the Past	Cloud geo-server (T15.7) Application profile for inscriptions (T4.4.13 and T14.2)
T16.8	ARIADNEplus for Preventive archaeology	Text mining & NLP (T15.4)

Table 1 – Main services used in pilots

3.2 Deviation from work plan

No substantial deviation from the work plan. Some of the pilots are more advanced than others, having already selected the data on which they will operate.

3.3 Plans for the next period

Monitoring will continue regularly, also in view of the planned workshop in summer 2021.

4 Task 16.2 - ARIADNEplus for Airborne-LiDAR data use and reuse

4.1 Pilot description

In archaeology, airborne-LiDAR (A-LiDAR) data are usually processed to produce derivatives, digital feature models (DFM). DFM's are encoded as very high-resolution images, where pixels represent the height of the terrain represented; to be suitable for archaeological interpretation they need a customized interface to provide visualization functionalities which should go beyond usual image visualization. Data-contributors are specialists in the field that currently don't have a suitable tool for dissemination (traditional articles are not a proper vehicle for the dissemination and analysis of those data). Service users are other interested researchers, e.g. A-LiDAR specialists or archaeologists interested in specific topics (e.g. Iron Age hillforts) or areas. They contribute expertise (e.g. archaeological analogy) and/or skills and tools for creative enhancement of the content. Data-users can explore (online, using VMS) and re-use (offline, VMS allows data download) the data. The following figures summarize the steps of the workflow for archaeological A-LIDAR data interpretation (Figure 4) and the results (Figure 5).
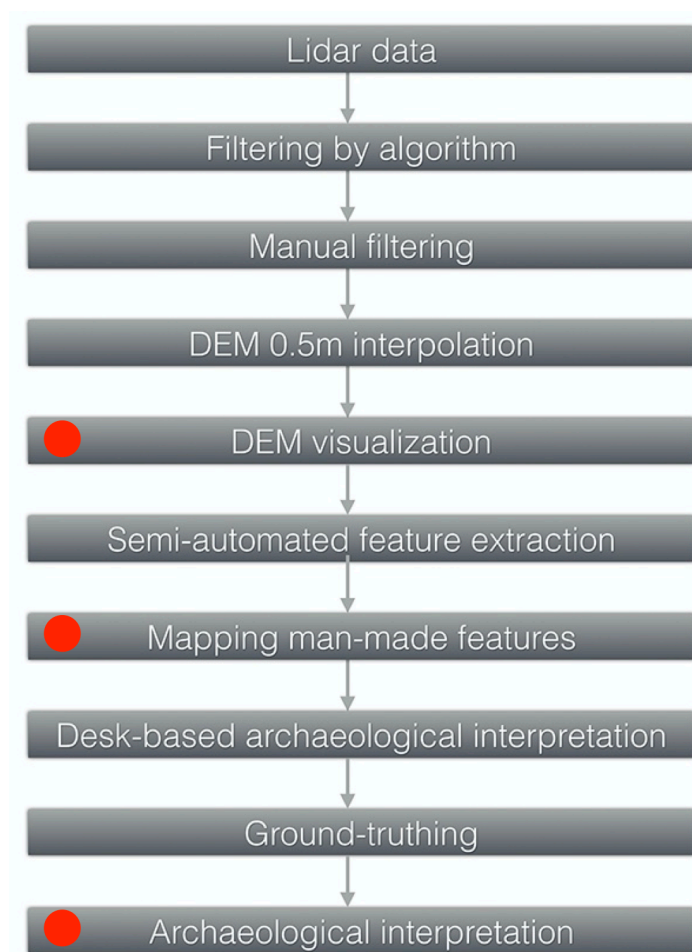
Figure 4. The procedure for archaeological interpretation of A-LIDAR data

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Figure 4 shows, in a simplified way, the steps of the procedure for the archaeological interpretation of A-LIDAR data. The steps indicated with a red dot produce maps where the archaeological results are progressively identified and evidenced (figure 5).
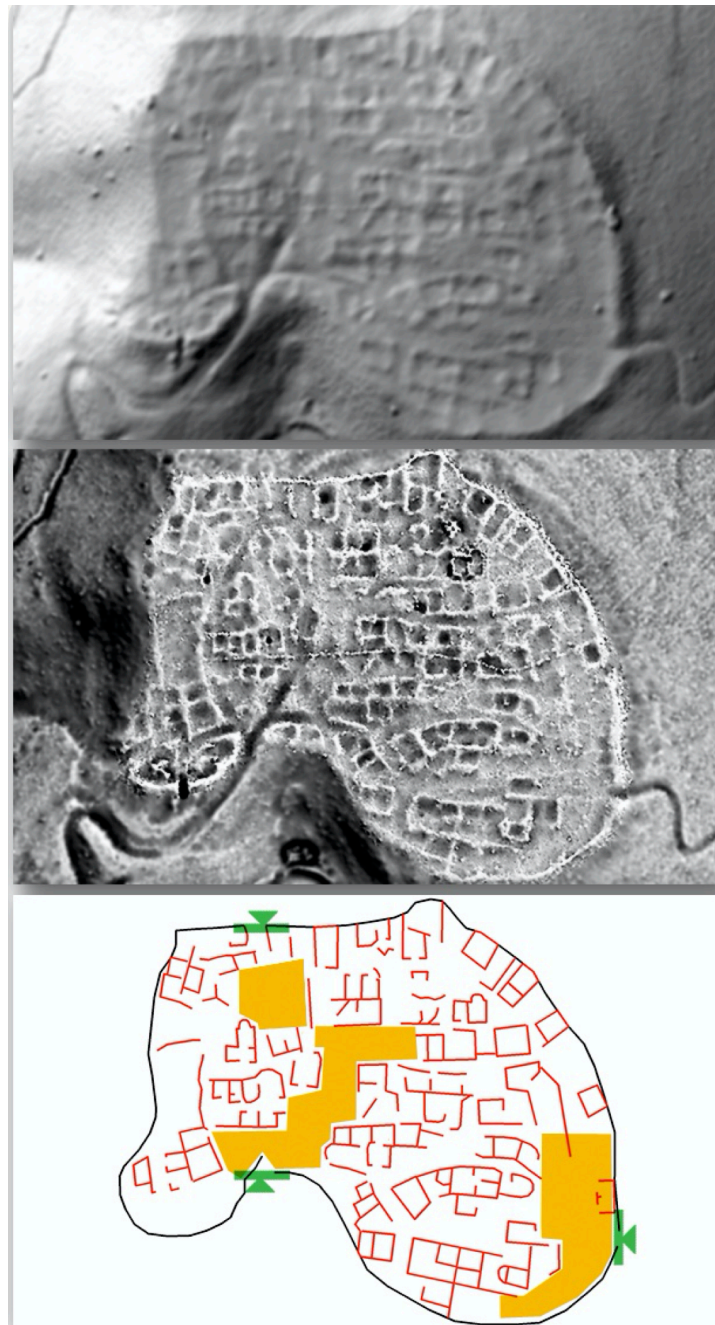
Figure 5. Maps corresponding, in order, to the steps evidenced with the red spots in Figure 4

Figure 5 depicts an example of archaeological interpretation based on A-LIDAR data, progressing from the DEM to the mapping of what appears as man-made features to the final archaeological interpretation of the site. The archaeological results provided by the last map may be further investigated. For example, in figure 5, it is supposed that particularly relevant areas, painted in yellow, are identified as well as other features marked in green, in this case gates or other entrances to the settlement.

As concerns this technology, A-LiDAR data have eclipsed past incremental improvements in remote sensing in archaeology over the last decade. It is rapidly becoming the most ubiquitous source of both remote sensing data and spatial data in archaeology. The field has reached – or is about to reach - methodological maturity in terms of archaeology-specific data processing and archaeological interpretation.

However, almost no attention has been paid in current research to the archiving and FAIR dissemination of archaeology-specific data derived from LiDAR. To date there are no recognised standards for archaeology-specific archiving. Dissemination to date remains based on printed or PDF articles. As a result, LiDAR has produced an unprecedented amount of new archaeological data in recent years, but the benefits for archaeology as a discipline remain limited. The following figure depicts a high-level design for the functionality of the ARIADNEplus pilot, aimed at overcoming the above-mentioned gap.[1]
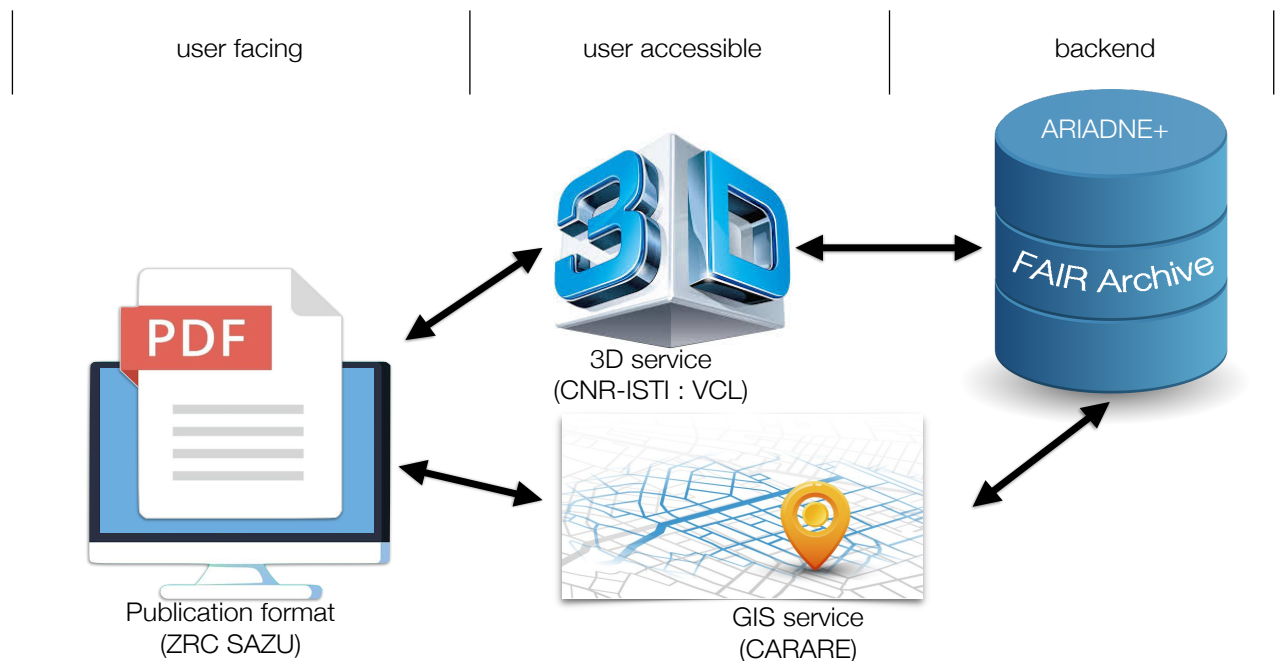
Figure 6. The pilot design, including the partners in charge of each component

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[1] Main references for this pilot:

Methodological Maturity of Airborne LiDAR in Archaeology - Pilot Project (MALiAp)

MALiAp:https://iza2.zrc-sazu.si/en/programi-in-projekti/methodological-maturity-of-airborne-lidar-in-archaeology-pilot-project-maliap#v

Štular B, Lozić E. Comparison of Filters for Archaeology-Specific Ground Extraction from Airborne LiDAR Point Clouds (2020). *Remote Sensing*. 2020; 12(18):3025. https://doi.org/10.3390/rs12183025

Lozić, E., Štular, B. Documentation of Archaeology-Specific Workflow for Airborne LiDAR Data Processing (2021). Geosciences 11 (1): 26. https://doi.org/10.3390/geosciences11010026

4.2 Perspective users and pilot dissemination

The target group of users of this pilot includes the following:

- Archaeologists working with remote sensing data
- Researchers working with airborne LiDAR
- Research data managers in *remote sensing*
- CH management and CH practitioners working with/in landscape
- Businesses working with airborne LiDAR data

Dissemination of scientific data is the Pilot's aim and in that sense the Pilot is promotion. Promotion avenues: scientific conferences (primarily CAA and EAA), ARIADNEplus web and social networks promotion.

4.3 Data to be used

The data necessary for the pilot include:

- Data set/collection: airborne LiDAR dataset (WP4.4.8)
- Data set/collection: ARKAS dataset (sites & monuments dataset for Slovenia)

Both datasets are in the pipeline for ARIADNEplus aggregation.

4.4 Pilot progress

The pilot has identified the necessary services, as shown in figure 6, and the data to be processed. Further implementation requires availability of both, which is expected for the first semester of 2021.

4.5 Deviation from work plan

No deviation from the work plan.

4.6 Plans for the next period

The pilot will follow the forthcoming progress in service implementation, especially as concerns the Geoserver. Dedicated meetings with the team in charge of it are planned to take place in the first half of 2021.

5 Task 16.3 - ARIADNEplus for a Historic Environment Spatial Data Infrastructure

5.1 Pilot description

The pilot will test and explore the potential for publishing, sharing and reusing archaeological geospatial datasets within Spatial Data Infrastructures (SDIs) frameworks.

The pilot will reuse geospatial services which are actively being registered within the ARIADNEplus partnership including Web Coverage Services (WCS), Web Feature Services (WFS) and Web Mapping Services (WMS).

Where services are available through ARIADNEplus portal, they will be utilised and integrated together with external data and employ complementary geoprocessing services to enhance and analyse geospatial data.

The pilot will also attempt to demonstrate some of the ambitions as laid out in the recently published paper "One Archaeology: A Manifesto for the Systematic and Effective Use of Mapped Data from Archaeological Fieldwork and Research"[2] and builds upon the already established reuses of geospatial data within the EU INSPIRE Directive

5.2 Perspective users and pilot dissemination

The target group of users of this pilot includes the following:

- Researchers in archaeology, geomatics, remote sensing geography, geology, historical geography, ecology, geophysics
- Research data managers in archaeology, geomatics, remote sensing geography, geology, historical geography, ecology, geophysics
- CH management, CH practitioners landscape archaeologist, field archaeologists
- Geospatial businesses and community
- Citizen scientists utilising geospatial data within their interests.

Size (estimate): Geospatial technology such as GIS underpins much of the research activity which takes place in archaeology and cultural heritage studies and the reuse and availability of such services will have wide-ranging benefits to a broad group of individuals.

Knowledge/skills required by target group for uptake: Users must have an understanding of how to connect to and reuse geospatial services within their own GIS platform.

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[2] Main reference for this pilot:
McKeague P, Corns A, Larsson Å, Moreau A, Posluschny A, Van Daele K, Evans T. (2020) "One Archaeology: A Manifesto for the Systematic and Effective Use of Mapped Data from Archaeological Fieldwork and Research" *Information*. 2020; 11(4):222.

Promotion will mainly take place through archaeological research associations as, among others, AARG, CAA, EAA, ICOMOS, ISAP. The pilot will be presented at their annual events.

The pilot will involve external organisations: a first list includes Historic Environment Scotland (HES), Geological Survey Ireland, Heritage Council Ireland and Transport Infrastructure Ireland (TII)

5.3 Data to be used

The data necessary for the pilot include:

- Data set/collection: airborne LiDAR dataset (WP4.4.8)
- Data set/collection: ARKAS dataset (sites & monuments dataset for Slovenia)

Both datasets are in the pipeline for ARIADNEplus aggregation.

5.4 Pilot progress

The pilot has identified the necessary services and the data to be processed. Further implementation requires availability of both, which is expected for the first semester of 2021.

5.5 Deviation from work plan

No deviation from the work plan.

5.6 Plans for the next period

The pilot will follow the forthcoming progress in service implementation, especially as concerns the Geoserver. Dedicated meetings with the team in charge of it are planned to take place in the first half of 2021, in collaboration with Task 16.2.

6 Task 16.4 - ARIADNEplus for sharing archaeology in 3D

6.1 Pilot description

The pilot aims at demonstrating the added value of ARIADNEplus for 3D field archaeological documentation and analysis, building on the 3D documentation of an archaeological site excavation. The pilot will show how the user can interact with the 3D model by taking measurements, cross-sections, volumes, and so on. Moreover, the 3D documentation can be used as a 3D excavation diary and be available as a good practice example. A CIDOC CRM-based repository of the archaeological data will be created and linked with the 3D model. Thus, this pilot will create an innovative way of experimenting and navigating into an excavation. A rescue excavation in Larnaca will be used as an example of use of the pilot. At present, the system is already working within the CyI platform. To be available in ARIADNEplus, it just needs porting in the ARIADNEplus framework. Also the data – the 3D models – which at present are being hosted on the CyTera server at CyI, need to be available within ARIADNEplus. The system enables performing various operations as illustrated below[3].

Figure 7. The excavation to be used as case study

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[3] The main references for this pilot are:

Abate D., Avgousti A., Faka M., Hermon S., Bakirtzis N., Christofi P. (2017) "An Online 3D Database System for Endangered Architectural and Archaeological Heritage in The South-Eastern Mediterranean" *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, Volume XLII-2/W3

Abate D., Faka M., Hermon S., Herbst J., Margaritis E., Boyd M., Renfrew C. (2018) "A Browser-Based 3D Scientific Visualisation of the Keros Excavations" (Accepted/In press) *Proceedings of the Computer Applications and Quantitative Methods in Archaeology (CAA) international conference, 19- 23 March 2018, Tübingen, Germany*.

Figure 8. An orthophoto (1mm ground resolution) of the excavation

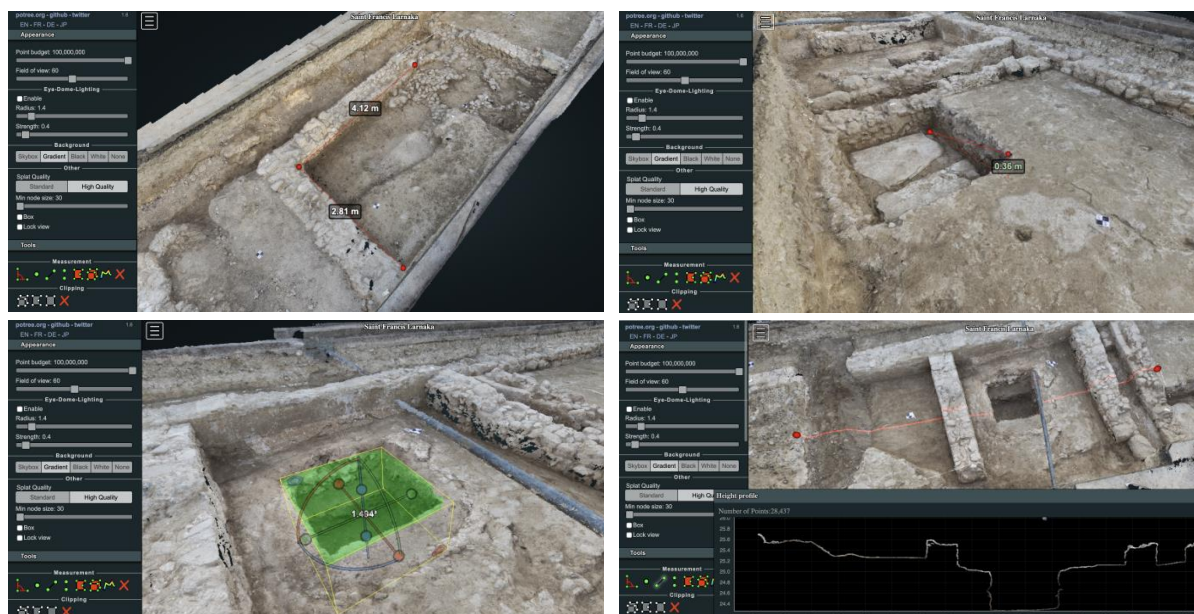*Figure 9. The 3D model of the excavation*

Figure 10. Various measurements enabled by the system: distance (top left), height (top right), volume (bottom left) and elevation profile (bottom right)

6.2 Perspective users and pilot dissemination

The target group of users of this pilot includes the following:

- Groups such as professional archaeologists and researchers for research purpose
- Archaeological and heritage institutions
- CH professionals and management (i.e. museums and Department of Antiquities)
- Archaeology and Cultural Heritage students
- General public for virtually experimenting archaeology

Size (estimate): Large group of users

Knowledge/skills required by target group for uptake: According to a survey run under the subtask 15.2.3, users found the features of the platform easy to manage. Moreover, a series of documentation, tutorials and video tutorials have been created for supporting the users. They will be adapted to the version incorporated in the ARIADNEplus service portfolio.

The pilot could be promoted as a tool for 3D field archaeological documentation and 3D models analysis as well as a tool for risk assessment and conservation in Cultural Heritage and archaeology at scientific conferences such as, for example, the CAA, EAA, and CHNT annual events.

The pilot will involve the Cyprus Departments of Antiquities, to collaborate on data re-use.

6.3 Data to be used

Currently there are no usable 3D models in ARIADNEplus apt for the current pilot (e.g., archaeological excavation documentation). The CyI collection of archaeological excavation 3D models is currently stored in the CyI digital library and it should be mobilized and registered in ARIADNEplus. The relevant dataset has been identified and available for such integration.

6.4 Pilot progress

The pilot is collaborating with CNR to set up the porting and with the team in charge of aggregation to make the necessary data available within ARIADNEplus. Advancement is expected for the first semester of 2021.

6.5 Deviation from work plan

No deviation from the work plan.

6.6 Plans for the next period

The pilot will continue collaborating with the involved parties (mainly CNR) to set up the conditions for further progress, as described above and with the Cyprus DoA to collect and aggregate the data.

7 Task 16.5 - ARIADNEplus for public/community archaeology

7.1 Pilot description

Members of the public producing finds (public finders) are encouraged to actively use ARIADNEplus as a citizen science research tool. More specifically, the aim is to create awareness for the ARIADNEplus digital resources and services among public finders in participating countries/regions. Target groups are encouraged to use ARIADNEplus as a reference collection and a tool for identifying, dating and contextualizing new finds.

The pilot will focus on national communities of public finders in countries/regions where the legal framework allows members of the public to search for archaeological artefacts in a responsible manner.

Most archaeological objects are the result of expert investigations by professional archaeologists. Such investigations can be conducted by archaeological companies, museums or universities. However, a growing number of archaeological discoveries is also made by members of the public, either by chance or as a result of targeted search for archaeological objects. These finds are designated as 'public finds'.

The search for archaeological artefacts and coins by members of the public is the subject of national or regional heritage protection laws, which differ from country to country and sometimes even from region to region. While legal frameworks in some countries/regions allow or even encourage members of the public to search and salvage archaeological finds as long as this is done in a responsible manner, other countries have banned or at least restricted this practice in order to safeguard the archaeological heritage against plunder, destruction and theft. Public finds in the ARIADNEplus database all stem from countries/regions with legal frameworks allowing members of the public to search for archaeological artefacts in a responsible manner.

The vast majority of public finds in the ARIADNEplus database are portable antiquities, i.e. single artefacts found on the surface of cultivated fields or retrieved from the plough soil. The public finds category is extremely varied. Finds range over a broad chronological span, from the earliest traces of human activity to modern 20th century artefacts. Typical objects are stone tools (mainly dating to the Stone Age), ceramics (from all periods) and metal artefacts and coins (mainly from the Bronze Age and until modern times). The overrepresentation of metal artefacts and coins among public finds is due to the widespread use of metal detectors in countries where this practice is permitted.

In contrast to archaeological finds from expert excavations, portable antiquities normally lack a narrowly defined context. In most cases, the finds context is the plough soil horizon they were embedded in. In other cases, the context may not have been recorded or even destroyed due to irresponsible behaviour of the finder in the field. Portable antiquities can be used in archaeological research like all other archaeological finds. Working with portable antiquities as scientific data only requires a specific analytical approach in order to make them contribute

to our understanding of the past. A preposition for using portable antiquities as scientific data is that they are digitally recorded and made publicly accessible.

Most of the finds designated as public finds in the ARIADNEplus database stem from a number of national or regional recording schemes, designed to facilitate the recording of artefacts and coins found by members of the public. While in some of these schemes, artefact recording is done primarily by professional archaeologists, others allow finders to record their finds directly, e.g. via a specifically designed user-interface/application.

The recording schemes currently pushing selected data into the ARIADNEplus database are:

- DIME (Denmark)
- PAS (England and Wales) via ADS
- PAN (The Netherlands) via DANS
- SuALT/FindSampo (Finland)

Within academia the broader social trends towards civic inclusion and public participation are increasingly assimilated under the banner of citizen science. Public participation in scientific research has become increasingly relevant over the past decades, also in archaeology. This not only as a means of acquiring big data but also as an avenue towards a more democratic approach to research and a broader appraisal of evidence based and informed decision-making in society. Many public finders are highly committed to their hobby and engage actively and creatively with the archaeological record. Many are driven by a genuine interest in their own and other's finds. With the inclusion of public finds in the ARIADNEplus infrastructure, we also want to provide these public finders with a research tool. Public finders with a special interest in specific artefact categories can actively use the ARIADNEplus portal as a reference collection and learn more about their finds and what they represent.

The concept of public finds is a contentious issue. Heritage sites from all periods across Europe have been plundered by illegal or irresponsible public finders in search of artefacts for their own personal collections or for sale, or simply in ignorance. Heritage crime and illegal treasure hunting constitutes a severe threat and thousands of archaeological artefacts are discovered by private finders violating protection laws or ignoring basic principles of best archaeological practice in the field. The antiquities procured by such illegal searches rarely reach the light of day and certainly not the records of the official heritage management agencies or research institutions. Accompanied only by limited information – if any at all – on contexts and location, these antiquities will always remain blind sources.

Metal artefacts and coins make up the majority of the finds categorized as 'public finds'. Most of them are the result of targeted surveys using metal detectors. The use of metal detectors to find archaeological artefacts is a popular hobby in many European countries with a growing number of practitioners. The recording schemes currently pushing selected data into the ARIADNEplus database have all been initiated mainly to facilitate the recording of metal detector finds, under national or regional legal frameworks allowing this practice. Hobby metal detecting for archaeological objects is a contentious issue. Some argue in favour of restrictive policies towards non-professional metal detecting in order to protect the archaeological heritage against luting and irresponsible practice. Others argue in favour of a cooperative

approach in order to make finds and data accessible to the general public and for research as well as to include the public in the management of the archaeological heritage.

The following figures illustrate some activities and the result (public finds) of amateur searching,[4]

Figure 11. Searching with metal detectors (picture: Kim Roslev)

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[4] Main references for this pilot:

Dobat, A., Deckers, P., Heeren, S., Lewis, M., Thomas, S., & Wessman, A. (2020). "Towards a Cooperative Approach to Hobby Metal Detecting: The European Public Finds Recording Network (EPFRN) Vision Statement" *European Journal of Archaeology*, 23(2), 272-292. doi:10.1017/eaa.2020.1

Gill, D.W.J. (2010). The Portable Antiquities Scheme and the Treasure Act: Protecting the Archaeology of England and Wales? *Papers from the Institute of Archaeology*, 20: 1-11.

Hardy, S.A. (2017). "Quantitative Analysis of Open-Source Data on Metal Detecting for Cultural Property: Estimation of the Scale and Intensity of Metal Detecting and the Quantity of Metal-Detected Cultural Goods". *Cogent Social Sciences*, 3: 1298397.

https://doi.org/10.1080/23311886.2017.1298397.

Rodríguez Temiño, I. & Roma Valdés, A. (2015). "Fighting against the Archaeological Looting and the Illicit Trade of Antiquities in Spain". *International Journal of Cultural Property*, 22: 111–30. https://doi.org/10.1017/S094073911500003X.

Council of Europe (199). "European Convention on the Protection of the Archaeological Heritage, Valletta, 16.I.1992" (Council of Europe Treaty No.143). https://www.coe.int/en/web/conventions/full-list/-/conventions/rms/090000168007bd25

Wessman, A., Thomas, S., Rohiola, V., Koho, M., Ikkala, E., Tuominen, J., Hyvönen, E., Kuitunen J., Parviainen, H. & Niukkanen, M. (2019). "Citizen Science in Archaeology: Developing a Collaborative Web Service for Archaeological Finds in Finland". In: J. H. Jameson & S. Musteață, eds. "Transforming Heritage Practice in the 21st Century, Contributions from Community Archaeology (One World Archaeology)". Cham: Springer, pp. 337-352.

Figure 12. Some public finds

Figure 13. Archaeologists at work to validate public finds in Denmark (picture: Bo Grønhøj & Østfyns Museer)

7.2 Perspective users and pilot dissemination

The target group of users of this pilot includes the following:

- Citizen scientists
- Amateur archaeologists
- Metal detector users (in countries where this practice is permitted)

Size (estimate): potentially large

Knowledge/skills required by target group for uptake: none.

Public finds (and the contribution of public finders to ARIADNEplus data needs to be highlighted through 'tagging' of public finds and provisioning of information material. Information material on 'public finds' in ARIADNEplus, e.g. in the portal, will include information on legal frameworks and policies to academic debates and will also cover the potential and downside of public finders including irresponsible metal detecting and other forms of heritage crime. Different options for how to realise the 'tagging/highlighting' of finds as 'public finds' are being discussed.

The pilot will involve the DIME (DK), PAS (UK), PAN (NL) projects and the Finnish Heritage Agency, in addition to some ARIADNEplus partners.

7.3 Data to be used

All finds data contained in the ARIADNEplus portal can be drawn on. However, focus would naturally be on the public finds category, which must be aggregated in the ARIADNEplus framework. For public finds, it would be useful to provide a thumbnail, i.e. a small picture of the object in the result list, this will need to be verified with partners in charge of the search functionality.

7.4 Pilot progress

The pilot is progressing in defining contributions by several organizations and from inside ARIADNEplus, including the adaptation/extension of its ontology to allow the visualization of a thumbnail of the object. All national data repositories feeding finds data to ARIADNEplus can be expected to differentiate between primary and secondary images of finds, with the thumbnail in ARIADNEplus always being the primary image in the original data repositories.

7.5 Deviation from work plan

No deviation from the work plan.

7.6 Plans for the next period

The pilot will continue collaborating with the involved parties (mainly CNR) to investigate the feasibility of the implementation of the extra functionality and to progress in the aggregation of the required data.

8 Task 16.6 - ARIADNEplus for understanding ancient and present cities: scanning the heart of Rome

8.1 Pilot description

The aim of the pilot is a dynamic visualization of the evolution of the area both in terms of the monuments and the elevations/morphology. It would be achieved by means of a "time bar" that can be used to dynamically navigate between the various ages displaying the changes on the map.

This pilot is a sort of proof of concept of how the Temporal GIS will work in ARIADNEplus and in the Italian National Geoportal for Archaeology. It represents a test bed for the spatio-temporal layer that will be deployed in the forthcoming national portal: a hub that will collect and make accessible the Italian archaeological heritage (with territorial data coming both from universities and research bodies and from the preventive archaeology of the MIBACT protection activities). The Italian Geoportal will become an ARIADNEplus National Hub, and this can ensure that data is updated over time.
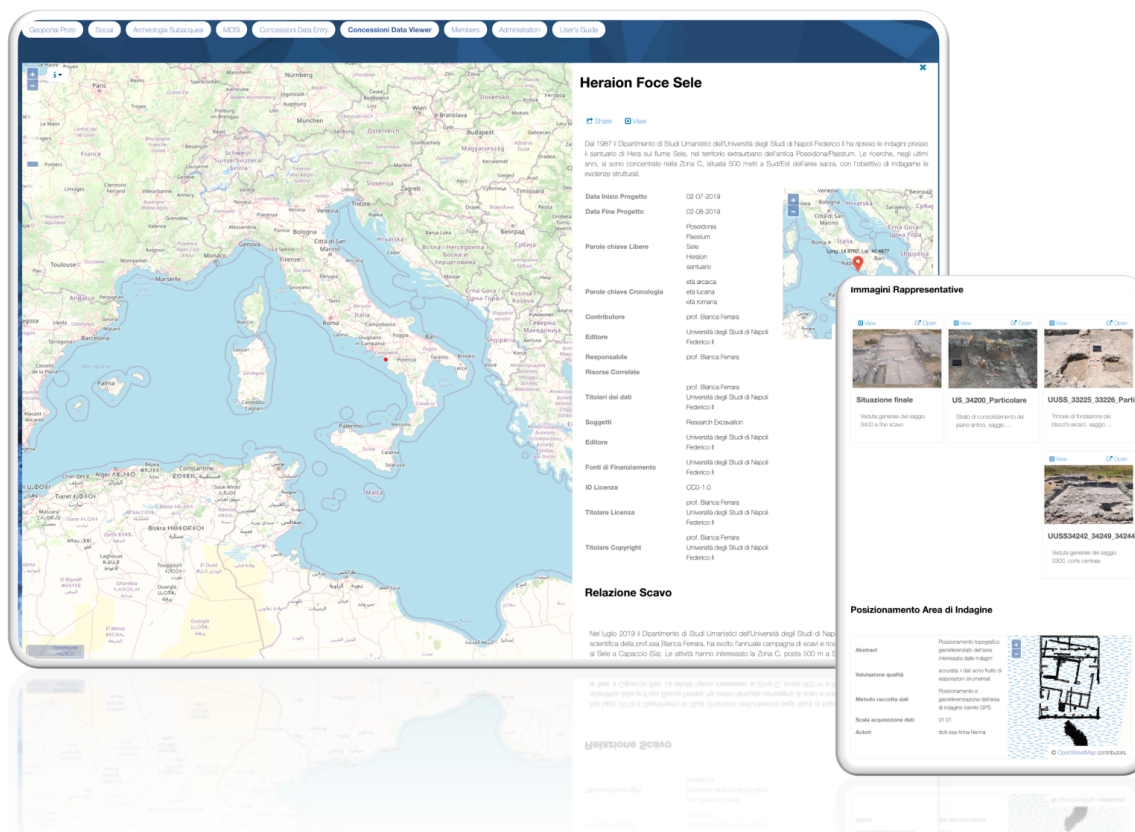

Figure 14. The forthcoming Italian Archaeological geoportal

The pilot will provide access to archaeological data about one of the most central areas in Rome over the time. The delimited area is the Esquiline hill which comprises the modern districts of Monti and Esquilino. This area has been selected as in ancient times the Esquiline

was a boundary zone between the urban and suburban areas, offering both funerary and settlement archaeological finds.
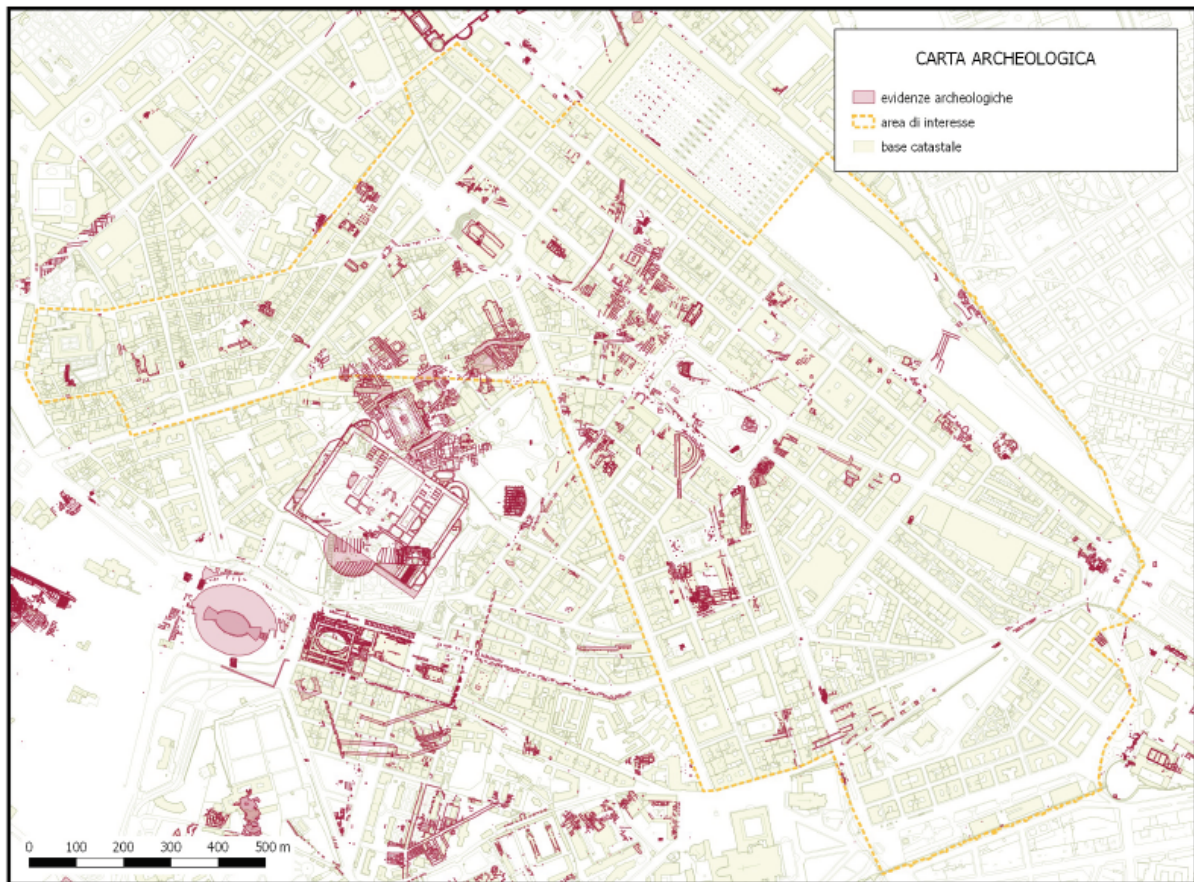

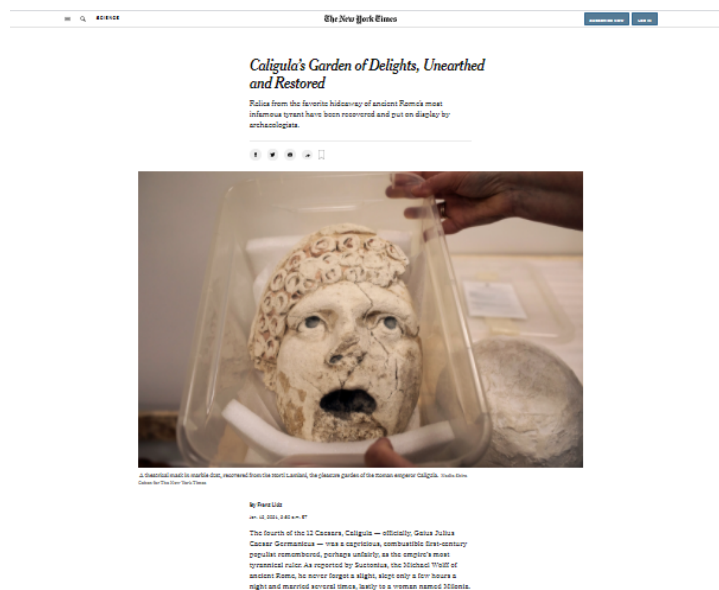*Figure 15. The selected area and the archaeological evidence it includes*

Figure 16. A recent discovery in the study area, as featured on the New York Times

The pilot is based on the ARIADNEplus Temporal GIS, an innovative service developed by CNR-ISTI which makes possible to integrate different kind of data (excavation data from different archives, museum collections, historical cartography in a spatio-temporal database) allowing the archaeological context to be recreated and showing the transformation of an urban landscape through the centuries. Thus, this technology will make it possible to recreate the contextuality and synchronicity of data.

8.2 Perspective users and pilot dissemination

About target groups for the pilot, they can be all those around the world of archaeology: researchers, students as well as Museum staff, Archaeological Offices staff but also managers and data curator. But this pilot may also be of interest to tourists because it allows visitors to understand the various architectural phases of a given area.

Size (estimate): Large group of users.

Knowledge/skills required by target group for uptake may vary according to the use and the user, ranging from a simple user-friendly interface to more in-depth usage.

Dissemination of the pilot will take place through conferences and other presentations addressed both to the stakeholders and to the general public. Also targeted publications for a specialised audience will be considered as well as promotion of the pilot through the MIBACT institutional channels: social pages, and ICA, ICCU and CulturaItalia website.

The two projects crucial for the realisation of the pilot are: the SITAR project that will provide data, and the National Geoportal for Archaeology which will first process the data and then send them to Ariadne Plus.

8.3 Data to be used

Datasets that will be used are related to findings from excavations in Rome, in the area of viae Labicana and Tiburtina, where there is a wide necropolis developed since the 8th century BC until the first imperial period. Monumental buildings as the Porticus Liviae, the Macellum Liviae, the Forum Esquilinum, but also private urban villas as the horti Maecenatis and the horti Lamiani were built in first imperial period and used until the Late antiquity. Such datasets include:

- Archeological data published by the SITAR project (Archaeological Territorial Information System Of Rome). Integration of this dataset with ARIADNEplus through the National Geoportal for Archaeology is in progress
- Metadata (and previews) to digital collections of the Museums in which archaeological finds coming from Esquiline excavations are exhibited such as the National Roman Museum, the Capitoline Museums and the Centrale Montemartini Museum
- Documents and historical maps about the phase of major excavations at the end of the 19th century preserved in the Capitoline Historical Archive
- John-Henry Parker's photographs held at the British School in Rome.

8.4 Pilot progress

The pilot is collaborating with CNR to set up the Geoportal service and implementing it in the pilot. The datasets have been identified and are being prepared for aggregation.

8.5 Deviation from work plan

No deviation from the work plan.

8.6 Plans for the next period

The pilot will continue collaborating with the involved parties (mainly CNR) to implement the Geoportal service and its temporal functionality. Dataset collection will start in spring 2021 and the service will be tested in the second half of the year.

9 Task 16.7 - Exploiting the ARIADNEplus Data Infrastructure to understand complex phenomena of the Past

9.1 Pilot description

The task will highlight the added-value of ARIADNEplus for academic projects addressing Grand Challenges in archaeological research. It will build on the connexion between the largest dataset of amphorae inscriptions and ARIADNEplus. The database created by CEIPAC since 1995 represents the largest available dataset of amphorae epigraphy, its relational repository with more than 43,000 entries of both amphorae stamps and tituli picti.

A specific ontology has been developed within the EPnet project to integrate the dataset with the Heidelberg Datenbank and the Pleiades geographical dataset, by relying on the OBDI paradigm, to create a more functional database to historical and archaeological research. The database is a major tool for exploring different hypotheses and theories about Roman economy, and the Mediterranean trade routes.

The pilot aims at exploring how the integration of such data within ARIADNEplus may provide new insights into Roman trade routes and the links created by olive oil trade between Baetica and Rome as resulting from the inscriptions on amphorae used for transporting the oil to Rome, which were disposed of after delivery and created the famous mount Testaccio in Rome.

9.2 Perspective users and pilot dissemination

The pilot results may be of interest to all researchers interested in the Roman period and to understand how commerce developed in the Roman empire. It is also relevant to offer applications for the integration of inscriptions in the ARIADNEplus ontology.

9.3 Data to be used

The pilot will use the database created by EPnet and map semantic structure to the ARIADNEplus ontology and epigraphy application profile (Subtask 4.4.13). Integration of such datasets in the ARIADNEplus framework is currently under study.

9.4 Pilot progress

Progress for this task is related to the development of the Inscriptions application profile, which is one of the more advanced developments among the subgroups of Task 4.4. The impact on this pilot is still very limited.

9.5 Deviation from work plan

Considering the interdependence from other tasks, notably 4.4.13, it was expected that this pilot would start late in the project. The development has also been affected by changes in the team at UB which took some time to complete and caused a stop in the pilot development.

9.6 Plans for the next period

UB collaboration with other partners on 4.4.13 is expected to restart soon, once the re-staffing at UB is completed. This is expected to restart also the pilot activity.

10 Task 16.8 - ARIADNEplus for Preventive Archaeology

10.1 Pilot description

The task highlights the value of ARIADNEplus for preventive archaeology (also variously known as rescue, developer-funded, or contract archaeology in some countries, according to their legislative systems). What they have in common is that an unfortunate split has often developed between those state organisations, museums or commercial contractors who undertake most excavation and fieldwork (generating primary research data) and those archaeologists working in research institutes and universities (who consume the data and also generate synthesis and interpretation). This has created a dangerous gap, whereby archaeological synthesis may be years out-of-date, and new fieldwork may be undertaken without any research context.

The task will demonstrate the value of ARIADNEplus in bridging that gap.

The pilot will deploy the ARIADNEplus NLP services to extract added value (indexing, tagging, harmonisation of terminologies etc) from the vast quantity of grey literature (unpublished fieldwork reports) made available Open Access by INRAP (with additional potential cases studies in Dutch, English and Italian) making the data more accessible for researchers.

In return, this will demonstrate to those undertaking fieldwork that ARIADNEplus can enhance their public and research profile and make their primary data re-usable, thereby encouraging them to provide greater access and showing the value and impact of the application of the FAIR principles to preventive archaeology.

10.2 Perspective users and pilot dissemination

As already mentioned, the outcomes of the pilot may be of interest to professional "contract" archaeologists as well as to researchers, fostering the exchange of knowledge between the two. When available, it will be disseminated through the usual channels, typically specialized conferences of the sector such as CAA, EAA and so on.

10.3 Data to be used

The data for the pilot will be a subset selected among the datasets already provided by INRAP to the ARIADNEplus aggregation system.

10.4 Pilot progress

So far the team in charge of the pilot has been waiting for the ARIADNEplus NLP service to be functional also for French. It is waiting to prepare a set to be used to train the NLP service for French.

10.5 Deviation from work plan

Although the pilot has not yet fully started its activity, this was expected due to the strict dependence on the availability of the NLP ARIADNEplus service.

10.6 Plans for the next period

The plan consists in the provision of a set of prepared INRAP datasets to the team in charge of the NLP service to train it for French. It is planned that this will start in the present year, according to the completion of a beta version of the NLP software.

11 Conclusions

It was clear since the beginning that the implementation of the pilots heavily depends on the availability of the services they aim at demonstrating. The overall pilot progress is uneven mainly for this reason. However, most of the preparatory activities have been carried out, such as defining the test datasets, expressing any additional requirement for the services they plan to use, understanding better how they will use the implemented services for their purpose and so on.

Not unexpectedly, a more evident progress will take place in the second project period. This may limit the time necessary for dissemination – but that is a common issue for projects that complete their plans close to the project end and little time is then available for dissemination and take-up: for their nature, pilots need to be fully functional before they can be demonstrated and disseminate.