QFIELD, PYARCHINIT AND BRADYPUS , INTERCHANGE OF PROTOCOLS AND WORKFLOWS FOR ACADEMIC RESEARCH

by Giuseppe Guarino, Paolo Rosati

Fig. 1 - Using the integrated systems on the field-work.

In the past, documenting archaeological research was based mainly on subjective experience due to the lack of digital platforms that would standardise documenting a context. Although it is in the last two decades that practice has been digitally standardised.
Some user-friendly systems help collect and organise data.. Sometimes, they seem non-interoperable. Then it is to study a unique method capable of making different software communicate with each other.
The aim of this study is the integration of state-of-the-art software to aid in developing a criterion for the creation of an archaeological data interchange protocol. FLOSS was chosen as it offers the highest level of interoperability.
One premise, it is assumed that you already have pyArchInit 2.6.2 on your computer, a server with BraDypUS 4.0 installed and a PostgreSQL database.

The systems used

The article focuses on finding a single workflow between Qfield, PyArchInit and BraDypUS to find if it is possible to make the different software communicate. Qfield is a handy Android app developed by OPENGIS.ch, also known as "QGIS for mobile", is a necessary open-source tool for fieldwork research. PyArchInit is the QGIS plugin for archaeology, developed by Luca Mandolesi implemented by Enzo Cocca and Ad Arte s.r.l. (Cocca and Mandolesi 2013) with the continuous support of Una Quantum inc. organization (Montagnetti and Rosati 2018). PyArchInit is highly suitable for a desktop GIS-managing of the stratigraphical archaeological excavations. BraDypUS is a broad CMS for archaeology developed by Julian Bogdani; BraDypUS enables users to freely build and implement a relational database and publish data online with customisable interfaces (Bogdani 2021).
According to the philosophy of GNU's movement with the "Free software", "... the user have the freedom to run, copy, distribute, study, modify and improve the software." (Bogdani 2019 p. 124 and ss.)[1]. Thus, FLOSS allows using some open formats and databases for their easy exchange between systems, otherwise hardly possible with licensed solutions. Using the proposed method, we can create synergistic relationships between various research groups and projects without passing different data from one programme to another, thus avoiding the risk of format incompatibility.

From PyArchInit to BraDypUS and vice versa

This is the central issue of this study. In the archaeological world, it is customary to use software developed for different purposes, while either pyArchInit and BraDypUS are customised for archaeology. PyArchInit is almost entirely developed in Python, and it is based on a fixed database schema, consisting of mandatory fields that are fundamental for the plugin like 'Site' and 'Stratigraphic Unit' tables. PyArchInit is available as a plugin for QGIS, whose main purpose is to work with spatial data. BraDypUS uses different web languages like JavaScript, PHP, Twig and Css. The program is totally versatile and allows full customisation for relational databases. BraDypUS needs to be installed on its own computer or server, and it is to set up a php environment on its own OS.
The two systems have been connected by using a Spatial RDBMS to solve the problem due to the different structures. Both programs are able to connect with PostgreSQL and PostGIS as a solution to allow several people to work together on the same project.
As mentioned above, due to the fixed database schema of PyArchInit, we need to build the database using pyArchInit's

#	Name	Type	Null
0	id_sito	INTEGER	N
1	sito	TEXT	Y
2	nazione	VARCHAR(100)	Y
3	regione	VARCHAR(100)	Y
4	comune	VARCHAR(100)	Y
5	descrizione	TEXT	Y
6	provincia	TEXT	Y
7	definizione_sito	VARCHAR	Y
8	find_check	INTEGER	Y
9	sito_path	VARCHAR	Y

Tab 1. PyArchInit "Scheda Sito" - Site table, (credits Enzo Cocca 2021)

tool, then connect the database to BraDypUS. Then is to create the necessary tables and relationships to use the database in BraDypUS as the below example. The pyArchInit mandatory protocol is the "Tabella di sito" - Site tabl
The Site Table is easy and simple to reply to and rebuild. On the contrary, the" US_table" in PyArchInit has 95 fields mandatory for the Italian '*Soprintendenza'* standards. What is in the "US_table" is the Italian Heritage Ministry standard for the SU. In PyArchInit, every other table, layer, view and tool is dependent on these two tables in a tree scheme.
The simplest way will be to connect PyArchInit and BraDypUS through the same Postgres Database.
It is to replicate this scheme by adding in PyArchInit two new fields ("id" and "creator") that are mandatory in the BraDypUS DB scheme and during the conference will explain the full exchange protocol between the two systems.
The aim is to maintain the PyArchInit and BraDypUS aligned. PyArchInit is a desktop tool, BraDypUS is a web device. To connect them, to switch between could be essential for empowering the researcher's possibilities and enlarging their future capabilities.

The workflow, however, still needs to be tested further to understand if these two systems can be used within a research team on the field.

From GIS archaeological platform to QField

That part of the workflow is explained in the recent work to be published in the ArcheoFOSS 2019 Acts (see Guarino and Montagnetti 2021). The main benefits of using the QField app concern acquiring the data directly on the field on our QGIS project. Working with both QField and QGIS (using PyArchInit as a spatial database tool for archaeological data storage) allows archaeologists working in the field to reduce the work of entering data into the database system by eliminating the related paperwork (Guarino and Montagnetti 2021). QField allows users to view and manage a GIS project on a smartphone or tablet, allowing the user to retain all the themes, labels and styles set up that are in the original project. In addition, the power of the smartphone's built-in geographic positioning system can be exploited. If more precision is required, geodetic positioning methods can be used via GNSS in NRTK mode.

This tool seems to be one of the best ways to record archaeological features on the field, especially when it is to record data and collect pictures directly on our QGIS project, thus allowing to keep the photos linked at the features.

Bibliographical References

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Cocca Enzo and Luca Mandolesi (2013) 'Pyarchinit: gli sviluppi dopo archeofoss 2009'. In *Atti 7° workshop su "Free, Libre and Open Source Software e Open Format nei processi di ricerca archeologica"*, 128–38. Firenze: All'insegna del Giglio.

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Abstract

The last years of research led the authors to develop and study methods and protocols to interchange data and workflows between Qfield (QGIS mobile), pyArchInit (the first plugin for archaeology in QGIS) and the archaeological CMS BraDypUS. The present work aims to present the rationalisation of the workflows achieved during the last years of research to spread the cross-use of these powerful tools. Indeed, each of these three software systems has its unique field of application and potential. However, it is their complementary use in pairs or together that reveals their greatest potential. This work summarises and reports on the current methods (2021) that make it feasible to work simultaneously on the mobile, desktop and web fronts, according to each need, by sublimating the scientific potential of these used systems.

Keywords

Archaeology; GIS; Foss archaeological documentation; Archaeological protocol documentation; QField; PyArchInit; BraDypUS

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List of FLOSS software used/data repository and licence

1 QFIELD, GNU Public License (GPL) Version 2; 2 BraDypUS , MIT license; PyArchInit GNU Public License (GPL) Version 2.

End notes

[1]https://www.gnu.org/philosophy/free-sw.en.html
[2] https://docs.bdus.cloud/environment/setup-windows (accessed 15/09/2021)