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DIGITHRACE: DIGITAL TOOL COMBINING DIVERSE TYPES OF SOURCES (A SHORT RESEARCH CONCEPT PRESENTATION)

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DigiThrace: Digital Tool Combining Diverse Types of Sources (A Short Research Concept Presentation)

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Abstract: This paper presents the conceptual motivation, technical approach, and resulting capabilities of the concept of creating a unified environment for the management of historical source data. The experimental environment integrates epigraphic research workflow into the Corpus Nummorum (CN) Editor, originally designed for numismatic research. Based on and extending the CN open-access data model and freeware, the experimental work introduces full support for epigraphic objects, “Epigraphy”, as a new primary entity within the system. The backend and frontend underwent development, including database schema extensions, indexing logic, API enhancements, and the creation of dedicated editorial and search interfaces. Thus, the ‘DigiThrace’ tool, based on a domain-specific numismatic tool, aims to be a broader environment for integrating diverse source types. The results demonstrate that heterogeneous archaeological and historical data types can coexist within a unified digital research infrastructure, enabling cross-domain analysis, richer metadata modelling, and enhanced interoperability.

Keywords: ’DigiThrace’ tool, Corpus Nummorum (CN) Editor, multi-source-type research database.

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The Concept

There are highly developed active single-source-type research platforms (Ivanova-Anaplioti, Grozdanova 2025). Feasibly needed is a way to systematise, accumulate and analyse information through a unified multi-source-type research database. Following the principles of Linked Open Data, as well as the FAIR and CARE principles, a relational DB analytic tool[1] ‘DigiThrace’

[1] On the subsequent development stages, we are aiming to map it to an RDF database and SPARQL, consequently implementing also AI models.

for the cultural heritage of ancient Thrace started to be developed within the Project 'Measuring Ancient Thrace' (BNSF № КП-06-Н50/3 – 30.11.2020) (**Fig. 1**), under the scientific lead of Assoc. Prof. Dr. Julia Tzvetkova (Boteva, Tzvetkova, Grozdanova, 2024). The concept aimed to be fully tailored to the needs of the researchers, while also taking into consideration the needs of the students, young scholars, and even broader public interested in scientifically proven data. Its design incorporated the team's experience in the research, processing, and analysis of diverse monuments, with an additional emphasis on multilingualism since the beginning. An essential part of the endeavour was that working with our partners from Corpus Nummorum has presented us with a highly developed open-source tool based on numismatic materials, with a data model that proved highly adaptable. The experimental extension of the numismatic data model for epigraphic materials presented us with promising proof of concept, both for the quality of the CN platform and Editor (Петер 2021; Peter, Stolba 2025) (**Fig. 2**), and for the idea that combining diverse source types within a single structure is a functional and scientifically promising approach (**Fig. 3**).

Fig. 1. Project 'Measuring Ancient Thrace' Logo.

Fig. 2. Corpus Nummorum Logo.

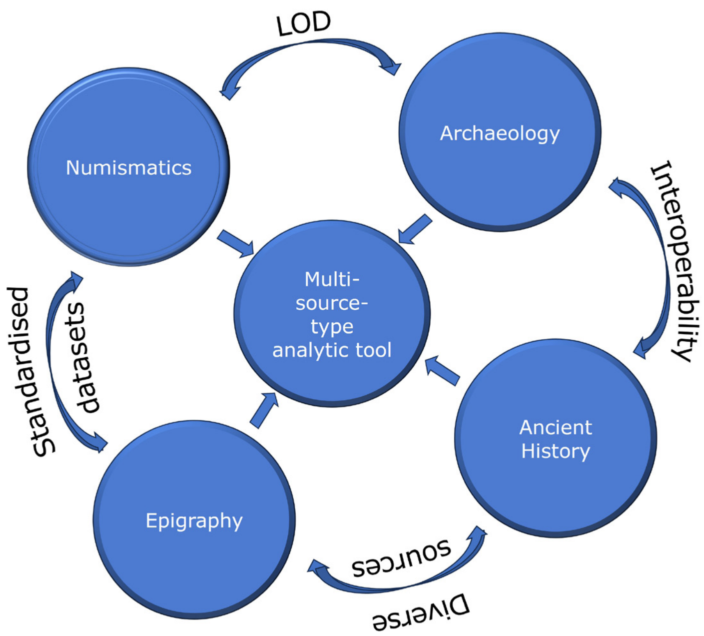

Fig. 3. Heterogeneus historical sources DB concept visualisation.

The project BNSF КП-06-Н80/7, 08.12.2023 "Upgrading the Historical Narrative: From *Deultum* to **DigiDeultum**", under the scientific lead of Prof. Dr. Lyudmil Vagalinski (NAIM-BAS), poses the basic question: *Has digital humanities, particularly the study of Antiquity, reached the level of synthesising new research directions, methods, and ultimately – upgraded knowledge?* The project explores whether there is a fundamental shift in the reconstruction of historical narratives by combining traditional historical and archaeological methods with digital humanities and the archaeological sciences to study and reconsider the historical narrative of the Roman colony of Deultum (Grozdanova, forthcoming) (**Fig. 4**).

Fig. 4. DigiDeultum Logo.

Within the **DigiDeultum project**, we have the opportunity to test the DigiThrace tool with a particular research object, thereby strengthening coherence and collaboration with other projects and the development concept. We are working on populating the DB with both numismatic and epigraphic datasets of materials from the Roman colony of *Deultum*. The aim is to test the possibilities by simultaneously analysing diverse materials, queried with shared mechanisms to address complex questions, such as why the coinage produced by the city mint (AD 212–249) still does not seem to dominate any of the coin finds from the different areas of the colony itself. Thus, it initiates the process of building the new, upgraded historical narrative. Enabling cross-domain computational analysis by harmonising indexing, search, image handling, and linkage mechanisms across heterogeneous archaeological objects is especially important in the age of AI and its proactive implementation in research and development.

To achieve the project's goals, re-engineering parts of the CN system was needed to accommodate new entity-specific data.

Approaching the issue methodologically

The development strategy was structured around several technical pillars.

The backend architectural extensions for epigraphic monuments were added alongside the existing ones within the CN data model and the Editor's primary entities (*coins* and *types*). Following the principles of separation of concerns, with dedicated controllers and modular handlers for select, join, where, and order-by operations the process involved: creating an epigraphy database schema with numerous associated tables; implementing parametric and ID-based request handlers tailored to epigraphy's structured metadata; extending the indexing pipeline to incorporate epigraphy-specific secondary data such as owners, inscription metadata, and monument characteristics; and enhancing support for new image types and gallery-style image collections.

Another aspect is the frontend integration in the CN Editor user interface by creating components designed to accommodate epigraphic workflows:

- Epigraphy editor sections with additional fields, such as find circumstances, preservation, etc.;
- New search capabilities supporting epigraphy-specific filters (such as monument type, inscription type, find conditions, ornamentation, etc), as well as being able to query simultaneously numismatic and epigraphic datasets;
- Dedicated display modes, including a card layout;
- Support for image galleries in addition to obverse–reverse layouts typical for coins.

Further, the editor was expanded to handle epigraphy state management, caching, list providers, and entity attributes.

Secondary entities were also added, allowing the system to support a set of new linked epigraphic entities, each with its own CRUD logic, list handlers, and UI components. These entities enrich the semantic landscape of records and the data model as a whole, enabling controlled vocabularies, structured dropdowns, and advanced filtering.

A central challenge was the harmonisation logic across different entities despite their structural differences. The indexing logic and query-resolution strategies were enhanced to support mixed-entity parametric search while preventing inconsistent filters through additional safeguards (**Fig. 5**).

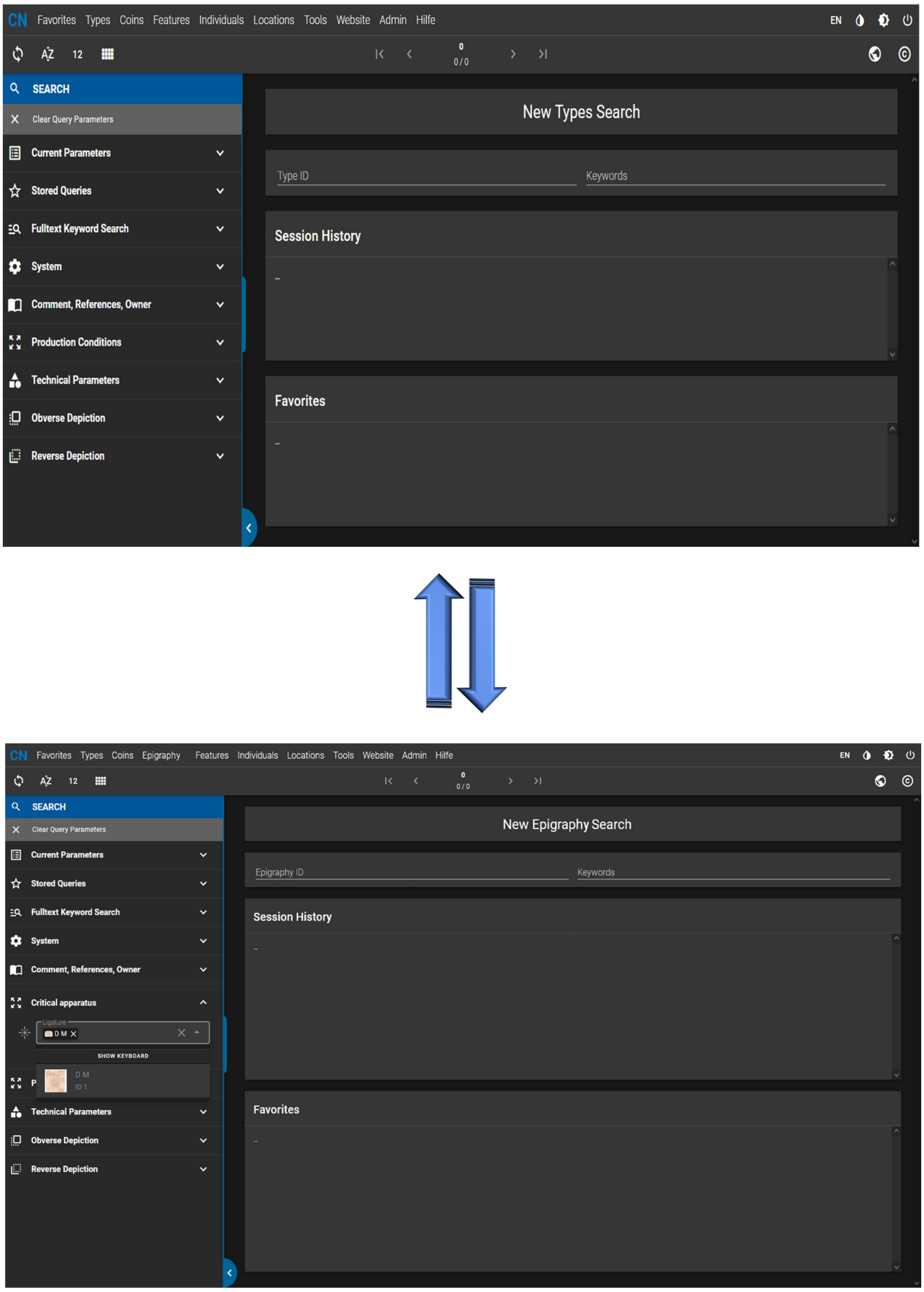

Fig. 5. CN Editor extended for inscriptions.

Testing stage results

The modified CN environment, implemented by the DigiThrace tool, now integrates epigraphic and numismatic data, allowing scholars to create, edit, and publish inscription datasets using the same workflows as for coins; to conduct searches within or across different categories using consistent interface patterns; and to leverage harmonised indexing to perform broader comparative studies.

The platform seems to effectively transform into a multi-domain archaeological editor with a coherent architecture. It follows and reflects the up-to-date practices in digital epigraphy and supports advanced cataloguing standards. The enriched indexing pipeline improves the resolution and accuracy of search results and enables cross-referencing between numismatic and epigraphic data.

The further development of the User Interface aims at providing a high-engagement usability environment for both expert and novice contributors by introducing, for example, consistent visual patterns for coins and inscriptions (**Fig. 6**).

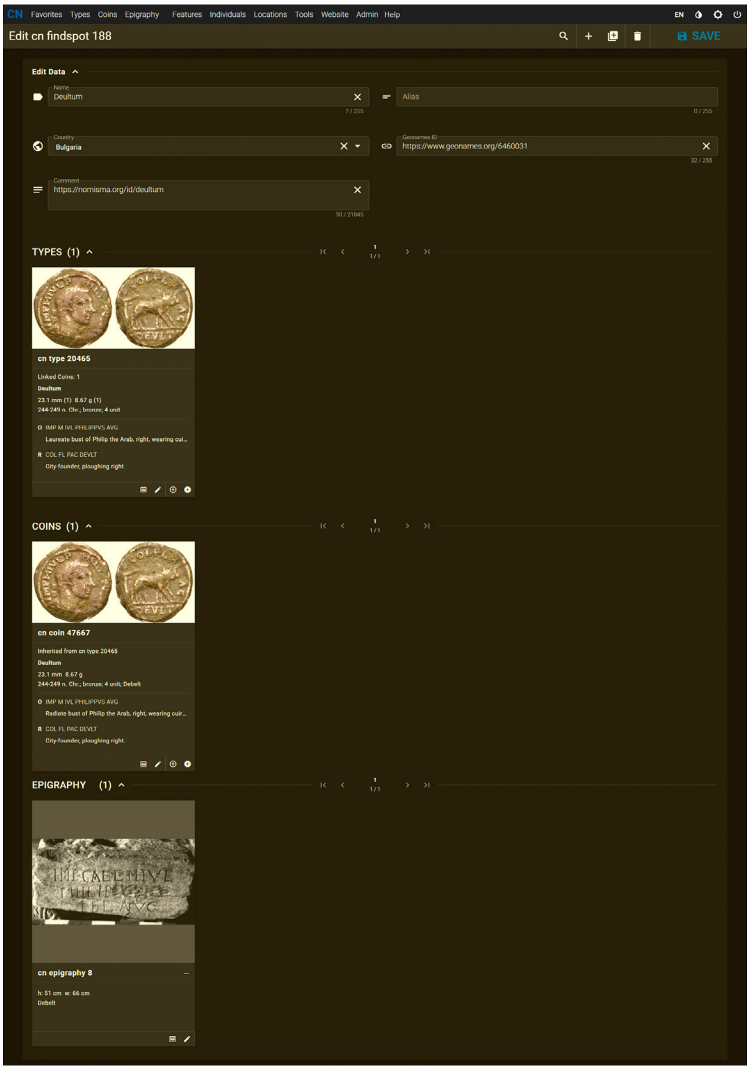

Fig. 6. DigiDeultum data input DB query result.

To conclude

The development and the ongoing testing within **DigiDeultum** seem to indicate that a unified data infrastructure for heterogeneous historical sources is both feasible and advantageous. Several technical insights emerged as:

- **Modular handlers are essential** when object types have diverging metadata structures. The separation of select, join, where, and order-by logic enabled fine-grained optimisation for epigraphic workflows without breaking the numismatic functionality.
- **Unified UX does not mean identical UX**. Instead of forcing coins and epigraphy into the same form template, the editor adapts dynamically, preserving consistency while

respecting disciplinary differences.

- **Indexing is a critical integration layer**. By treating indexing as an intermediary between heterogeneous data and search interfaces, the system maintains flexibility and clarity in query outcomes.
- **Secondary entities form the semantic backbone** of epigraphic cataloguing. Without structured lists for monument types, observation types, etc., the richness of the data would be diminished (intentionally structured with an AI tool paragraph by Atanas Georgiev).

This work suggests that integrated archaeological information systems should emphasise modularity, controlled vocabularies, image abstraction layers, and strong separation of concerns between backend modules.

The intermediary results demonstrate the viability and scholarly value of integrating diverse historical source datasets within a harmonised digital environment, while also opening scientific research opportunities, and consider the possibility of implementing different types of visual, linguistic (see also Peter, Stolba 2025) or multimodal AI concepts (see also https://accs-network.com/counterfeits-info-cards-collection/).

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