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Teaching Digital Byzantine Sigillography: First Experiences and Future Strategies

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This paper delves into the preliminary results and future initiatives concerning the pedagogical aspects of two funded projects, DigiByzSeal (supported by the Deutsche Forschungsgemeinschaft and the Agence Nationale de la Recherche) and DiBS (funded by the VolkswagenStiftung), which jointly aim to advance the field of Byzantine Sigillography. One of the objectives of these projects that stands out most prominently is the establishment of a sustainable, research-based, digital teaching infrastructure, along with the introduction of innovative pedagogical methods. In this paper, we specifically scrutinize two distinct teaching formats: (1) SigiDoc training weeks, designed to equip experts in Byzantine Sigillography with proficiency in XML and data modelling, and (2) an international seminar centred around the creation of a permanent digital exhibition addressing various facets of Byzantine society through the lens of seals. These instructional approaches present both organizational and conceptual complexities. However, the overarching aim in both cases is to optimize data reuse for sustainability, accessibility, and informed utilization. Furthermore, this paper touches upon the implementation of collaborative digital strategies pertaining to Byzantine artefacts containing textual elements. It underscores the cultivation of interdisciplinary exchanges with the field of Digital Humanities and the integration of globally shared pedagogical concepts within Byzantine Sigillography and Byzantine Studies at large.

Cet article explore les résultats préliminaires et les initiatives futures concernant les aspects pédagogiques de deux projets, DigiByzSeal (soutenu par la Deutsche Forschungsgemeinschaft et l'Agence Nationale de la Recherche) et DiBS (financé par la VolkswagenStiftung), qui visent conjointement à faire progresser le domaine de la sigillographie byzantine. L'un des objectifs les plus marquants de ces projets est la mise en place d'une infrastructure d'enseignement numérique durable et basée sur la recherche, ainsi que l'introduction de méthodes pédagogiques innovantes. Dans cet article, nous examinons spécifiquement deux formats d'enseignement distincts : (1) les semaines de formation SigiDoc, conçues pour doter les experts en sigillographie byzantine de compétences

en XML et en modélisation de données, et (2) un séminaire international centré sur la création d'une exposition numérique permanente abordant divers aspects de la société byzantine à travers le prisme des sceaux. Ces approches pédagogiques présentent des complexités tant organisationnelles que conceptuelles. Cependant, l'objectif principal dans les deux cas est d'optimiser la réutilisation des données pour la durabilité, l'accessibilité et une utilisation éclairée. De plus, cet article aborde la mise en œuvre de stratégies numériques collaboratives concernant les artefacts byzantins contenant des éléments textuels. Il souligne la promotion des échanges interdisciplinaires avec le domaine des Humanités Numériques et l'intégration de concepts pédagogiques partagés à l'échelle mondiale dans la sigillographie byzantine et les études byzantines en général.

1. Byzantine seals and sigillography: State of the art

§ 1 As a discipline of medieval cultural studies, Byzantine Studies encompasses political and cultural history as well as philology and literary studies. A special focus of the Department of Byzantine and Modern Greek Studies of the University of Cologne lies with the so-called auxiliary sciences, such as Byzantine Sigillography, which, in their capacity as complementary historical sub-disciplines, aim at using critically historical sources for the reconstruction of historical facts and an assessment of the historical past.

§ 2 The study of seals is of major importance within the broader field of Byzantine Studies. Seals are coin-like objects mostly made of lead, whose two sides display images, inscriptions, monograms, and other ornamental motifs. According to current calculations, approximately 100,000 Byzantine lead seals have survived.

§ 3 Most importantly, seals were not manufactured by the state, nor did they have a pre-decided and typical design, such as the heraldic symbols in Medieval Latin Europe. Their design was chosen by the owner, and thus every single seal gives us access to the public image that a citizen of the empire projected to others. Seals are therefore exceptionally important for prosopographical research and the study of individuals, families, and relationships within a group of people. Since seals mention dignities and offices of the civil, military, and ecclesiastical administration, they offer the opportunity to reconstruct individual careers and, as a whole, provide a clear picture of the administrative apparatus, both central and provincial. Their testimony is invaluable for filling the gaps in written sources and for reconstructing administrative geography, as well as for illuminating the political history of Byzantium. Moreover, sigillographic iconography has considerable potential for the development of Byzantine art history because seals offer a corpus of religious imagery larger than that of any other medium in Byzantine art. Finally, sigillographic legends are of the utmost importance to Byzantine Philology, not only because they document otherwise unattested linguistic practices, but also because thousands of them are versified, thus illustrating the development of medieval Greek poetry.

§ 4 The potential of Byzantine seals, however, has not yet been fully exploited. This is due to a number of shortcomings, including restricted accessibility and limited use of seals by non-specialists (Jeffreys 2009). Still, the unpublished material greatly exceeds what has been published, and remains hard to access, since it is widely scattered over various public and private collections with different publishing policies. Moreover, existing paper publications are not easily available and not cost-effective, do not allow for updating, amending, and improving, and most of them have only low-quality images.

§ 5 Furthermore, there exists little to no scholarly training in Byzantine Sigillography. Training in reading and dating seals, for those who seek to go beyond employing them unquestioningly in their research, is a long-term undertaking, requiring the processing of several hundreds of seals to gain the relevant expertise. This commitment to long-term training and the complexities of the treatment of the material certainly discourage many scholars from joining the field and hinder the establishment of a new generation of sigillographers, which is a key factor in the survival of the discipline. In our understanding, a decisive shift towards a digital methodology in research and teaching is necessary in order to ensure that the discipline not only survives, but also evolves (Neuefeind et al. 2024). The digital turn of Byzantine Sigillography, however, has been slowed by the fact that most sigillographers lack both the digital expertise and the institutional support required for this task. Therefore, they are unable to guide the students interested in sigillography towards the digital transformation the discipline requires.

2. Byzantine Sigillography: A digital turn in research and teaching

§ 6 The digital turn needed for the advancement of Byzantine Sigillography must be accomplished through the development and promotion of an appropriate research-driven digital toolset aligned to the needs of the discipline. Additionally, it requires trained personnel and extensive international networking. A tool, SigiDoc, is currently being developed for this purpose via a cooperation between the University of Cologne and the French CNRS/UMR 8167 Orient & Méditerranée with joint funding from the *Deutsche Forschungsgemeinschaft* and the *Agence Nationale de la Recherche* (2022–2025). SigiDoc is a clean subset of EpiDoc and provides an XML-based and TEI-compliant encoding standard for the digital scholarly edition of Byzantine seals, which allows those involved to work digitally on various collections and ensures the interoperability of data amongst and outside the encoded corpora (on SigiDoc, see Sopracasa et al. 2024 in this volume, as well as Sopracasa 2022; Sopracasa and Filosa 2020; Sopracasa, Filosa, and Stoyanova 2020).

3. Teaching XML-based technologies to Byzantinists

§ 7 To use SigiDoc, specialized training is needed. This became evident from the early stages of SigiDoc's development, when Alessio Sopracasa, then a Marie Skłodowska-Curie fellow at King's College London, convened a workshop in 2016 with the purpose of instigating the interest of fellow scholars in the subject of digital sigillography. In 2017, in collaboration with the Cologne Center for eHumanities (CCeH), the Department of Byzantine and Modern Greek Studies of the University of Cologne hosted a training week aiming to investigate the potential of EpiDoc for non-epigraphic inscribed objects such as coins and seals. Another training session took

place, again in Cologne, in 2018, when EFES (EpiDoc Front End Services), a platform dedicated to the online publication of ancient texts in EpiDoc-XML (EFES 2024; Bodard and Yordanova 2020), was brought into contact with the newly created SigiDoc for the first time. The foundational teaching experience gained in these sessions was instrumental in honing the know-how that led us to secure DFG/ANR funding for the project "DigiByzSeal – Unlocking the Hidden Value of Seals: New Methodologies for Historical Research in Byzantine Studies." In this project we continue to leverage this expertise, placing a significant emphasis on extensive dissemination and training.

§ 8 It is in this context that we decided to implement SigiDoc training weeks. These training sessions are directly inspired by the well-established EpiDoc training weeks (Bodard and Vagionakis 2022; Bodard and Stoyanova 2016), which stand as a testament to the feasibility and effectiveness of such an instructional approach and are designed with the principal objectives of fostering best practices in (digital) sigillography and facilitating the widespread distribution of documentation and methodologies in the field. The training weeks have a diverse audience characterized by varying educational backgrounds and levels of prior expertise, including sigillographers, museum curators, students, and researchers specializing in the field of Byzantine Studies and neighbouring disciplines, as well as those engaged in the domain of Digital Humanities.

3.1 SigiDoc training weeks

§ 9 In its training approach, SigiDoc closely follows the approach of EpiDoc, which is distinguished by its participatory nature, its attentiveness to the requirements and preferences of learners, and its pronounced focus on practical application. Within this context, students acquire valuable insights and skills by engaging "hands-on" with digital encoding techniques. Among the various teaching methods employed over the years, it is the hands-on, "learning by doing" approach that has most consistently demonstrated its effectiveness within this type of training (Dee, Foradi, and Šarić 2016, 25–28).

3.1.1 Structure of a SigiDoc training week

§ 10 The training programs are flexible and can be delivered in person, online, or in a hybrid format. In the cases we are referencing here, both training sessions were conducted online. An example of hybrid and asynchronous training within Byzantine Sigillography at the University of Cologne is given in section 4.1 below. Detailed discourse on pedagogical methodologies and the specific instructional tools employed in this context are beyond the scope of our current discussion; a comprehensive examination of these topics is given in Bodard and Vagionakis (Bodard and Vagionakis 2022).

§ 11 Approximately two weeks before the training sessions begin, the teachers provide participants with detailed information about installing the necessary software, usually an XML editor and the project's customized instance of EFES, and teaching materials required to prepare for the training. Typically, these materials consist of concise video tutorials lasting approximately 5 to 20 minutes, accompanied by slideshows. The tutorials, spanning a range of topics, from the basics of XML to some of the most advanced EFES features, have been produced within the EpiDoc community from 2021 onwards (they can be found at Bodard et al. 2023; see also Bodard and Vagionakis 2022, 112). The teaching and self-training materials are designed to provide a gradual and progressive learning experience, allowing students the flexibility to access the materials in the order of their choice. Nonetheless, teachers might recommend a specific sequence for the materials, arranging them in ascending levels of complexity.

§ 12 The duration of the training program may vary depending on whether it is solely focused on SigiDoc and text encoding, or it requires an introduction to EFES. In the former scenario, we have observed that, if students have availed themselves of the preparatory teaching materials distributed prior to the training and have learned the relevant vocabulary and fundamental processes, a three-day training program proves adequate for comprehensive coverage. In the latter case, under the same set of assumptions, a five-day training program is necessary.

§ 13 A syllabus we have found to be particularly useful and versatile is organized as follows:

- Day 1: Software installation, troubleshooting, and theoretical introductions to the topics covered
- Day 2: Metadata markup
- Day 3: Edition markup
- Day 4: Data visualization and creation of a corpus using EFES
- Day 5: Querying and indexing within EFES

Each day of training consists of six working hours and follows a consistent structure: the teacher provides explanations (usually using visual support, such as slideshows) to cover the day's topics, addressing any questions from participants. After this short explanation (ca. 20% of the session), students engage in hands-on exercises guided by the teacher, during which they take turns sharing their work with the group via screen sharing, in the case of exclusively remote teaching. At the conclusion of each training session day, there is an hour dedicated to teacher-led, hands-on exercises, affording students the freedom to apply their recently acquired knowledge to their own materials and datasets.

3.1.2 Technologies employed and prospects for curriculum enhancement

§ 14 The SigiDoc training weeks place a strong emphasis on X technologies, namely XML and its associated data processing technologies. These have become indispensable in the field of Digital Humanities. The teaching of X technologies encompasses key elements of this domain, such as XML, XPath, XSLT, XQuery, XML databases, standards in the humanities (in our case, particularly TEI, EpiDoc, and SigiDoc), as well as other relevant web technologies and tools.

§ 15 Digital Humanities projects in general and those related to Byzantine Studies can certainly have very different aims and complexities. As a result, the resources and skills needed to implement them successfully may vary greatly. There cannot be a "one size fits all" solution, but there are some similar patterns that can be grouped into the following topics with a common technology stack, without any claim to completeness:

Digitalization

- Scanning (TIFF/JPEG/JPEG 2000 standards)
- Basic metadata creation
- Archiving
- Image server (IIIF standard)

Data modelling and encoding

- Schemas (DTD, XML Schema) and encoding standards (TEI, EpiDoc, SigiDoc)
- XML development tools (e.g., Oxygen XML Editor)
- Metadata creation
- Transcription creation

Beyond these basic skills, the following areas are relevant:

Data store

- Storage of XML data for management and presentation: NoSQL databases (BaseX, eXist) and XQuery
- Collaborative version control (GitHub, GitLab)

Data cleaning and enrichment

- Data querying (XPath)
- Data transformation (XSLT)

Data presentation and analysis

- Data visualization with web technologies (HTML, CSS, SVG, JavaScript/JS Frameworks)
- Visualization libraries and analysis tools (e.g., Leaflet, TimelineJS, Voyant Tools)
- 3D viewing

§ 16 The structure of the training weeks and the technologies employed prompt us to reflect on the essential skills in X technologies that sigillographers require, while also considering the boundary between valuable proficiencies and the risk of overextension. One potential solution involves creating an advanced training session tailored for students who have developed a deep understanding of XML, TEI, EpiDoc, and SigiDoc. In this framework, participants can enhance their skills in customizing EFES and other presentation and indexing tools, using XSLT and XPath, and gain a foundational understanding of CSS and HTML. Moreover, after establishing a cohort proficient in digital sigillography and X technologies, there is the opportunity to expand the curriculum to include AI-based tools and methods. As is well known, the prominence of AI is swiftly increasing across diverse domains, and Classics and neighbouring fields such as Greek Epigraphy are no exception, with *Ithaca*, the AI tool for restoring Greek inscriptions, at the forefront (Assael et al. 2022; Roueché 2022). To employ these tools and methods in Digital Humanities projects effectively, it is essential not merely to grasp their functioning but also to generate high-quality training data and identify the most effective processing workflow. Students, therefore, need to be acquainted with these facets to fully leverage the advantages of AI tools.

3.2. A flexible training approach for a diverse audience

§ 17 It is important to note that the implementation of digital components in research and teaching is very recent, and has not yet been established in Byzantine Studies, and even more so in Byzantine Sigillography: the University of Cologne is a pioneer in this respect. However, this avant-garde position means that many students in Byzantine Studies and neighbouring disciplines have scant, if any, foundational knowledge in the digital domain to draw upon. A minority of the participants in our training weeks might have had prior exposure to EpiDoc or TEI, or might have taught themselves XML-based technologies. The same observation can be made regarding familiarity with Byzantine Sigillography: given the rarity of formal university instruction, with only a few exceptions, it cannot be presumed that all Byzantine Studies scholars or students are familiar with this field. In this instance, there is a slightly different approach than the one employed by EpiDoc, where "a core assumption [...] has been that students and other participants bring the basic knowledge of their epigraphic or papyrological

disciplines, including the ancient languages, Leiden System or other conventions, publication traditions and scholarly tools" (Bodard and Vagionakis 2022, 106).

§ 18 Outlined in **Figure 1** and **Figure 2** are two diagrams showcasing the extent of expertise in Byzantine Sigillography and Digital Humanities on the part of the students who participated in two SigiDoc training weeks held in November 2021 and March 2023 respectively. The data were collected from the registration forms of the training weeks

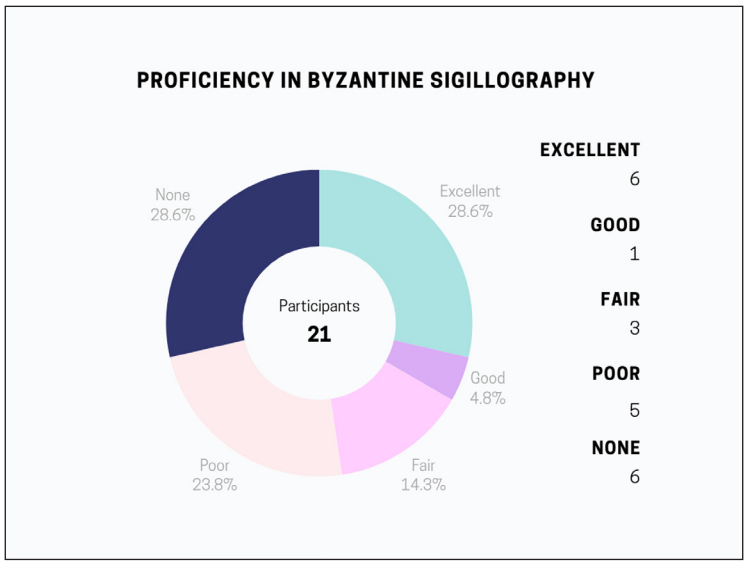

Figure 1: Proficiency in Byzantine Sigillography of the participants of two SigiDoc Online Training Weeks (November 2021 and March 2023).

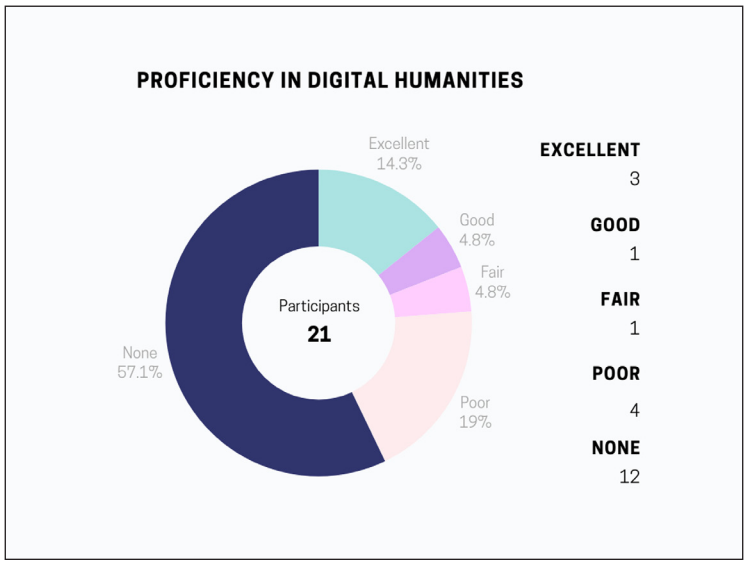

Figure 2: Proficiency in Digital Humanities of the participants of two SigiDoc Online Training Weeks (November 2021 and March 2023).

and processed according to the privacy policy of the University of Cologne. There was a total of 21 participants in these training sessions, including seven advanced MA students, five doctoral students, three researchers in Byzantine Studies, three curators of numismatic cabinets, and three software developers.

§ 19 One of the more complex facets involved in structuring a training week is ensuring that the pedagogical approach aligns with the content and the anticipated results, while also accommodating the varied backgrounds and needs of the participants. Notably, there is a substantial difference in training approaches depending on if the group of trainees is focused on short-term outcomes, such as scholars who need to jump into projects right after training, or on longer-term goals. Furthermore, the approach varies depending on whether the primary emphasis of the training is in the domain of data modelling, data visualization, or data valorization and display.

§ 20 In what follows, we will address two main categories of trainees, (1) those engaged in cultural heritage institutions, such as museum curators, and (2) early career researchers, doctoral students, and advanced students at MA level in Byzantine Studies or neighbouring fields such as Classics, Medieval History, and Art History. In this discussion, we deliberately exclude BA and MA students enrolled at the University of Cologne, for whom these courses, as well as those delineated in section 4.1, are a mandatory part of their degree requirements. The university courses offered to the students of the University of Cologne are discussed in section 4 below.

3.2.1. Museum curators and cultural heritage institutions workers

§ 21 To advance the field of Byzantine Sigillography and contribute to its sustainability, it is imperative actively to engage and to cooperate with museums and cultural heritage institutions, as they often serve as repositories for seals, thereby potentially playing a pivotal role in preserving and sharing this knowledge.

§ 22 The aim of the training programs involving museum curators is to enable these institutions to establish enduring access to their digitized collections, resulting in the enhancement of their curatorial catalogues. As a consequence, these institutions will be better equipped to offer engaging and accessible presentations of their collections to both physical and virtual visitors.

§ 23 Several museums renowned for their collections of Byzantine seals have joined our projects as external collaborators, sending curators and other staff to participate in SigiDoc training sessions in order to acquire the knowledge and skills necessary to create extensive and stable digital records of their sigillographic collections. These records may manifest themselves as digital-born publications or enhanced digital adaptations of their existing paper catalogues.

§ 24 Based on the insights gained from the training of museum curators conducted in March 2023, it is evident that this group of participants has a strong interest in assessing how the markup standard aligns with the existing systems and databases integrated within the museum's operational framework. Even though in the past couple of decades cultural heritage institutions have witnessed a growing involvement of IT experts who constitute the technical backbone and support for research projects emerging within these establishments (Marty 2005; Marty and Jones 2007), we have observed that museum curators and other persons working in cultural heritage institutions are very interested in understanding the different possibilities of dealing digitally with their material, with growing concerns regarding the interoperability and sustainable management of the collections. Participants from this category tend to specialize in a specific dataset, that is, the museum's collection, which, ideally, may already have undergone digitalization and can thus be dealt with as a digital artifact.

3.2.2. Advanced MA students, doctoral students, and early career researchers

§ 25 It has become clear that, in the contemporary academic environment, acquiring and proficiently utilizing digital skills is of paramount importance. It does not come as a surprise that the majority of our training participants are advanced MA students, doctoral students, and early career researchers in Byzantine Studies and neighbouring disciplines.

§ 26 This specific demographic has showcased an average-to-good proficiency in understanding the history and culture of the Byzantine Empire, including a basic comprehension of seals and their significance as historical sources, but a near-total lack of prior skills in the field of Digital Humanities. Certain participants, particularly those at an advanced academic level, usually approach the training sessions with a pre-established dataset, aiming to acquire a skillset that will then assume a crucial role in an ongoing or forthcoming research project.

§ 27 In our recent training sessions, participants frequently showed a preference for engaging with familiar materials. This trend is not just limited to digital sigillography workshops. Notably, during a week-long introduction to digital methodologies for Greek Palaeography and Byzantine Philology held in July 2023 within the framework of DiBS, primarily attended by doctoral students specializing in Byzantine Philology, a similar inclination was observed. This stands in contrast to the findings of Bodard and Vagionakis (Bodard and Vagionakis 2022, 115), who observed that students in remote training sessions leaned towards being given specified texts

for practice rather than choosing their own, be it from their individual projects or randomly from online corpora.

§ 28 For participants at a less advanced academic level, our teaching experience has shown that it is often helpful to provide specific material for the hands-on encoding exercises. This method empowers teachers to fine-tune the difficulty of the task, as they can choose seals with features that align with the students' proficiency levels.

4. University courses on Byzantine text-bearing objects and Digital Humanities

§ 29 Building on the experience from the SigiDoc training sessions and on our research on the materiality of Byzantine inscribed objects coupled with Digital Humanities, the Department of Byzantine Studies at the University of Cologne, in collaboration with the CCeH, secured a grant from the VolkswagenStiftung in 2022. This funding supports the six-year initiative "DiBS – Creating a Sustainable Digital Infrastructure for Research-Based Teaching in Byzantine Studies" (2022–2028), which aims at the valorization and strengthening of Byzantine Studies through the advancement of a cluster of four Byzantine auxiliary disciplines dealing with text-bearing objects—Sigillography, Numismatics, Epigraphy, and Greek Manuscript Studies.

§ 30 As already mentioned, a particular focus is given to didactic methods by incorporating digital aspects related to the mentioned disciplines into the main curriculum of Byzantine Studies at the University of Cologne. The project's first milestone, foundational for the development of all teaching endeavours, was the incorporation of new courses into the university's academic portfolio, solidifying them within dedicated teaching modules.

4.1 The teaching module "Digital Edition of Ancient and Byzantine Text-Bearing Objects"

§ 31 Beginning in the summer term 2024 (starting in April 2024), the teaching module titled "Digital Edition of Ancient and Byzantine Text-Bearing Objects" (ger. *Digitale Erschließung antiker und byzantinischer Textträger*) is offered to the students of the University of Cologne. At the heart of the module are three distinct types of courses, each one with specific objectives.

§ 32 The first type is a series of lectures that explores overarching methodological themes relating to the integration of Digital Humanities, particularly in connection with Byzantine Studies. The lecture series, co-hosted by the CCeH and the Institute of Digital Humanities, features content that extends beyond just (digital) Byzantine themes. Providing a broader scope allows students to explore the digital advancements in other neighbouring academic fields.

§ 33 The second type is the intensive week-long courses. They begin with an introductory session at the onset of the semester, during which instructors present key topics, both in terms of subject content and of the relevant technology. After this orientation, students begin the period of asynchronous learning, a vital step to deepen their understanding and prepare them for the intensive hands-on workshop scheduled for the conclusion of the semester. The entire semester's coursework, equivalent to 30 hours, is thus condensed into a single week. We have opted for this intensive format not only because we believe it is more effective than spreading two hours across weekly sessions throughout the semester, but also in order to accommodate international students, especially those from our numerous partner universities, more than 20 institutions all over the world.

§ 34 During the winter term 2023/24, two such week-long courses were available for students. The first provided an introduction to digital epigraphy under the title "Digital Approaches to Post-Byzantine Inscriptions," carried out in collaboration with our partners at St. Kliment Ohridski University of Sofia (Bulgaria), and the second course, titled "Approaching Byzantium through Seals: A Digital Exhibition," offered insights into digital sigillography. An in-depth discussion of the latter can be found in the following section (section 4.1) of this article.

§ 35 Finally, the third type is a digital crowd-sourcing encoding sprint, inviting not only students and scholars of Byzantine Studies and neighbouring fields but also experts from the cultural heritage sector and the broader community.

§ 36 This teaching module, comprising a lecture, seminar, and encoding sprint, is offered within the combined degree program "Ancient Languages and Cultures" (ger. *Antike Sprachen und Kulturen*, hereafter ASuK), as outlined in **Figure 3**. This integrated degree program, spanning both BA and MA levels, requires students to select two academic tracks from an array of disciplines including Ancient History, Byzantine Studies, Classical Literature, Classical Philology, Comparative Linguistics, Egyptology, Jewish Studies, Medieval Latin Philology, and Papyrology, Epigraphy, and Numismatics (PEN).

§ 37 Students pursuing both BA and MA degrees in the disciplines mentioned can opt for this module as one of their supplementary choices, deciding between earning 6 or 12 credit points. However, for those specializing in Byzantine Studies at the MA level, this module is a mandatory and essential component of their curriculum.

§ 38 In addition, single courses from the module described above will be exported to other non-ASuK degree programs, including the MA programs in Medieval Studies and in Information Processing.

Ergänzungsmodul 4 E: Digitale Erschließung antiker und byzantinischer Textträger (Digital Byzantine Studies)						
Kennnummer	**Workload**	**Leistungspunkte**	**Studiensemester**	**Häufigkeit des Angebots**	**Dauer**	
4235XBFB4e	360 h	12 LP	2.-5.	SoSe/WiSe	1-2 Semester	
1	**Lehrveranstaltungen**		**Kontaktzeit**	**Selbststudium**		
	a) VL: Digitale Methoden der Byzantinisitk		30 h	30 h		
	b) S: Digitale Erschließung von Siegeln und Münzen		30 h	60 h		
	c) S: Digitale Edition handschriftlicher und inschriftlicher Texte		30 h	60 h		
	d) Selbststudium			60 h		
	e) Modulprüfung (schriftlich)			60 h		
2	**Ziele des Moduls und zu erwerbende Kompetenzen** In diesem Modul erhalten die Studierenden einen grundlegenden Einblick in die digitalen Methoden der Erschließung byzantinischer Textträger mit besonderem Augenmerk auf Siegel, Münzen, Handschriften und Inschriften. Die Studierenden • erwerben fachspezifisches Wissen und grundlegende Fertigkeiten zur eigenständigen Anwendung der auf die jeweiligen Fachbereiche zugeschnittenen Software; • erlangen grundlegende Kenntnisse und Fertigkeiten zur Kritik und Interpretation der entsprechenden Quellen; • sind in der Lage, sich mit unveröffentlichtem Material auseinanderzusetzen und eine gedruckte und digitale Edition zu gestalten.						

Figure 3: Excerpt from the BA manual of course offerings in ASuK showing "Ergänzungsmodul 4E."

4.2 Approaching Byzantium through seals: A digital exhibition

§ 39 As explained above, the second teaching format designed for the module "Digital Edition of Ancient and Byzantine Text-Bearing Objects" by the DiBS team consists of an intensive week-long course during the winter term of 2023/2024. The course had three objectives: (1) to train students in using seals for the study of Byzantium, (2) to create an infrastructure that will facilitate the teaching of Byzantine Sigillography, and (3) to provide up-to-date information to the scientific community and the public about the potential of Byzantine Sigillography.

4.2.1 Scientific issues

§ 40 This course did not offer an introduction to Byzantine Sigillography but rather supplemented and provided an alternative to existing courses on the discipline. Understandably, it could not address all aspects of Byzantine Sigillography, but focused instead on the social status of the sealers and the various ways through which the Byzantines represented and expressed their social and cultural identity on their seals through images and inscriptions. Byzantine art was largely symbolic, and thus the iconography of the seals often had a meaning supposedly perceptible by contemporaries. As such, people often used a recognizable standard that would assimilate them to the social or cultural milieu with which they chose to identify. For example, holy figures were often saints who were chosen due to the individual's relation to them, either as patrons of their hometown or their family, or because of their attachment to a certain monastic community or church establishment.

§ 41 Accordingly, the legend of a seal usually contained all the information that the owner deemed necessary to display. For several centuries, it consisted, in most

cases, of the name, sometimes the surname, the dignity, and the offices or function of the sealer. This allows us to better place this person in the social scale and identify their milieu. Interestingly, from the eleventh century onwards, another way to identify people was invented: legends of seals constructed as epigrams, that is, short verses. Although in most of the cases these legends tell us little about the sealer's relation to the state machine, as used to be the norm until the tenth century, they tell us much more about the social and cultural values of the sealer's contemporary society.

§ 42 These were some of the scientific issues that preoccupied the course. Teaching followed the principles of DiBS: asynchronous learning, hands-on tasks, and research-based teaching. For this purpose, 32 seals were chosen, and each participant was assigned on average two seals to work on and produce an appropriate commentary addressing the issues that constitute the research topic of the seminar: the social status and milieu of the sealer, their self-presentation on the seal, and what the seal can tell us about the society and the culture of the period.

4.2.2 Participants of the course

§ 43 The participants enrolled in the course consisted of two groups: students at the University of Cologne, who were enrolled in the course as part of their curriculum, and external participants from around the world. The idea behind the involvement of a larger group of participants and outside the University of Cologne was to maximize the impact of the course and the quality of the research results. The upper limit of total participants was set to around 20, in order to safeguard efficiency. Eligible were postgraduate students, doctoral candidates, and early career researchers, that is, people oriented towards research. The prospective students were expected to have at least a basic knowledge of Byzantine history and an elementary understanding of Ancient and Medieval Greek, for this was something that we would not be able to provide but was essential for the kind of specialized research they would be conducting. At the same time, we did not regard specialized training in sigillography as essential to attend the course, since reading and dating seals were not part of it. The seminar included two introductory courses, which would provide all the necessary information and tools for the participants to carry out their research.

§ 44 Therefore, the call for applications was directed primarily to online newsletters and media related to the discipline of Byzantine Studies, although students and scholars of neighbouring fields (Classics, Medieval Studies, and Digital Humanities) were also encouraged to apply.

§ 45 The external participants—seventeen in total, from seven countries (Finland, France, Germany, Greece, Turkey, the UK, and the USA) and twelve different academic

institutions—went through a selection process on a number of criteria relating to their academic achievements and qualifications, their potential, and the relation of sigillography to their work and research interests. A secondary criterion for our selection was the creation of a group with diverse interests and backgrounds, which would be able to look at the research topics from different angles.

§ 46 The aims and the criteria set at the call for applications were largely fulfilled. The majority of the students had a focus on Byzantine Studies, and the remainder were sufficiently informed about the basics of the discipline. Many of the students had a basic knowledge of Byzantine Sigillography. Through their participation in this course, we were hoping to keep their research interests in this direction and thus help create a new generation of sigillographers. However, at the same time, there were also students with a study focus in Classics and in Medieval Studies, while two were dealing with seals in different milieus, namely in Latin Europe and in Ethiopia, which provided a strong comparative profile in the course. Some of the students had a background in Digital Humanities, an important aspect of this course.

§ 47 A total of five students applied from the University of Cologne: three were coming from the field of Byzantine Studies and the other two from the Digital Humanities. Unlike the majority of the students, the participants from the Digital Humanities had a minimal knowledge of Byzantine Studies. For this reason, their tasks were not related to analyzing seals but rather to implementing further features and visualization options for the digital exhibition and to being involved in the customization of the resulting website. For instance, an additional chronological visualization feature (i.e., a timeline) was added, as shown in **Figure 4**.

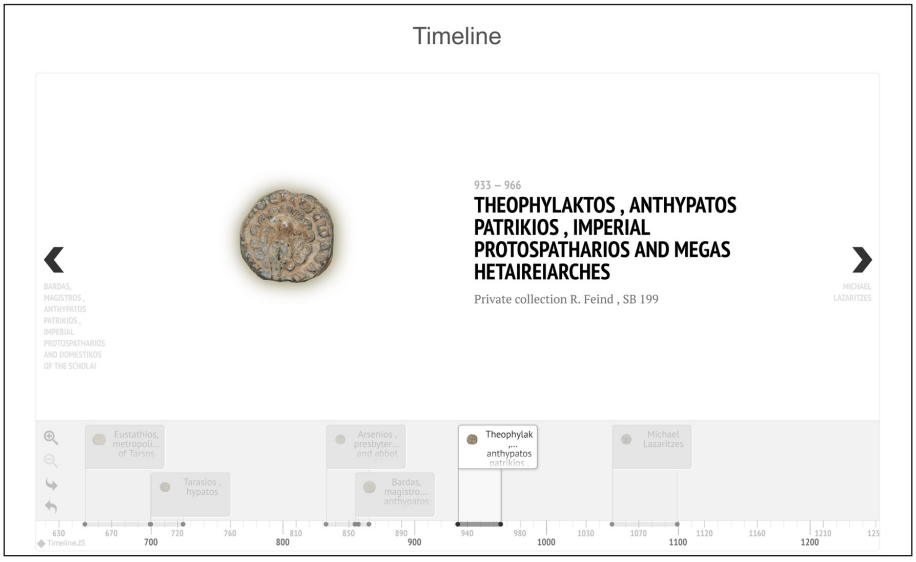

Figure 4: The timeline feature of the webpage hosting the digital exhibition.

§ 48 Their tasks were discussed and assigned according to the skills of the two students and the aims of the teaching module.

§ 49 Most of the total of 22 participants were postgraduate students (eleven MA/MPhil students and six PhD candidates), but there were also five early career researchers, all but one from the field of Byzantine Studies.

4.2.3 Timeline of the course

§ 50 The seminar began in November 2023 with two introductory sessions after which the participants received their handouts and the necessary bibliography. The assignment of the seals was first related to their research interests and qualifications. Second, for the sake of concision and focus, the seals assigned were not supposed to address a wide spectrum of research questions but were limited to a few specific issues. The students had about three months to complete their research, write short essays, and contribute, mainly in terms of content, to the development of the online exhibition.

§ 51 After this period, a full-day, week-long workshop took place, during which the students presented their research. The presentations were grouped by students who were addressing similar research questions. Each presentation was followed by a discussion among the participants and the instructor, which proved quite beneficial, owing perhaps to the diverse scholarly background of the participants. According to the feedback form the participants were called to fill in anonymously after the end of the workshop, these discussions were often deemed by the participants as the most beneficial teaching aspect of the workshop.

§ 52 After the individual presentations, students were divided into three teams. They were called to reflect upon the two main themes of the workshop: Byzantine society and Byzantine culture through seals. The students discussed their different views and the experience they gained during the workshop, and subsequently they were called to combine their common points and views into two presentations, one for each theme. The three groups debated at the closure of the workshop about their different views and on the aspects that they chose to highlight in their presentations.

§ 53 Due to its international dimension, the seminar was held in a hybrid format. The two introductory sessions in November took place exclusively online, while during the week-long workshop, students had the option to choose between an in-person or online participation. We were able to provide a few bursaries to unfunded students and scholars to allow them to attend the full week in person: in-person participation would confer the benefits of allowing the participants to interact better with the instructor, to become acquainted with DiBS and its team members, and to be able to use the library of the Department of Byzantine and Modern Greek Studies,

which is particularly well informed in the field of sigillography. Indeed, the majority of the students (15 out of 22) opted for an in-person participation. Nevertheless, the hybrid format worked smoothly, at least in terms of access to the teaching aspects of the workshop, and this was highlighted also by online participants, according to the anonymous feedback form.

4.2.4 The digital exhibition: Content and visual presentation

§ 54 The second main purpose of the workshop was to create an online platform in the form of a website, where the research conducted during the seminar will be uploaded. The website will have the form and function of informing the academic community and the public about the results achieved during the seminar and will be part of the already existing website of the DiBS project. For this purpose, we are going to adapt the existing website templates according to our needs and to integrate them into the DiBS project website. The current online exhibition website template has been implemented with the help of the Bootstrap framework. Bootstrap is a powerful, extensible, highly customizable, easy to maintain, free, and open-source framework. There are some ready-to-use tools for sharing digital collections, such as Omeka, or content management systems, such as WordPress, but these tend to be for more complex projects. Although such tools could be used in the future (the existing website of the DiBS project already uses WordPress), for the moment the Bootstrap solution may be the most appropriate.

§ 55 The website will consist of the following parts:

1. **Introductory texts.** These texts will introduce the user of the website to basic information on Byzantine Sigillography, on Byzantine society, and on the aims of the project and in particular of the digital exhibition.
2. **Social groups in Byzantine Sigillography.** These texts will be composed in interaction between the instructor and the participants and will contain general information about the role and function of this social group in Byzantine society and comment on its presence in Byzantine Sigillography.
3. **A digital exhibition of thirty-two Byzantine lead seals**. These 32 representative seals will be those initially selected and assigned to the participants of the seminar. They will be accompanied by a commentary on the owner of the seal, but mostly will highlight the issues that have been dealt with in the seminar. Each seal will be tagged with the social and cultural terms and topics that pertain to it.
4. **Short texts on social and cultural aspects of Byzantine Sigillography**. These texts will be short, ca. 300-400 words, and will provide background information to broader topics related to recurrent scientific aspects of the course, in order

to avoid repetition and digressions and emphasize concision in the commentary of each individual seal. In each essay, the points related to these short texts are marked with a question mark icon. Once the user hovers with their cursor on the icon, the relevant short text will appear in a cloud-like mode over the window. However, all these texts together will be concentrated in a separate section, where the reader would be additionally guided by an appropriate bibliography. Among others, there will be short texts on: "The cult of saints," "Faunal iconography," "Expressions of piety," and "Identity and iconoclasm."

5. **Specialized texts on Byzantine Sigillography and society.** These texts will offer specialized additional information but will have at the same time a rather general character on topics related to Byzantine seals. Experts in the field who have written on these issues will be called as authors. Topics will include "Metrical seals," "Dating Byzantine seals," "Monograms on Byzantine seals," "Foreigners in Byzantium," etc. They aim to attract a scholarly audience and provide deeper knowledge and information about specialized issues on both Byzantium and sigillography.
6. **Bibliography on Byzantine Sigillography.**

§ 56 All these different levels are expected to interact so that when, for example, in the relevant text regarding one social group (no. 2), there is discussion about a seal contained in the digital exhibition (no. 4), the user will receive a link to this tab. The final structure of the website will be discussed and evaluated together with the students, but a draft has already been prepared, as shown in **Figure 5** and **Figure 6**. The participants will be called to provide their insights and suggestions to the digital exhibition, in terms of functions of the website, structure of the digital exhibition, and the whole design.

Figure 5: Draft of the webpage hosting the digital exhibition.

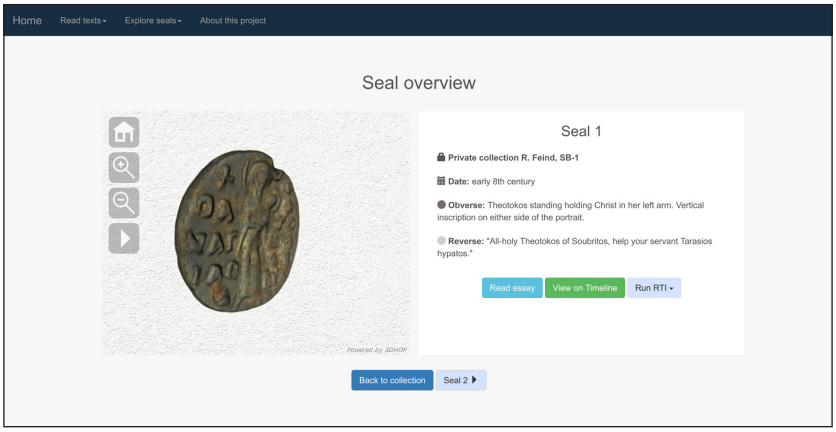

Figure 6: Overview of seal 1 (SB-1, Robert Feind Collection).

§ 57 We plan to implement several pages, which can be divided into three main menu categories. The first will contain texts, the links to the external resources, and similar subcategories.

§ 58 The digital exhibition of seals will be presented under the second menu item and may also contain different subcategories like "All seals," "Seals from social group A," "Seals from social group B" etc., so that the user can easily sort out the objects. The seal image will be clickable and will point to the metadata page or open the modal pop-up box. There will be multiple ways to edit the data, but the main way will be the web editor, which will be linked to the metadata files. It has a user-friendly interface where no encoding experience is required. In addition to the metadata, it will also be possible to view the seal images not only as a simple image, but also in 3D view (**Figure 7**), which gives the impression of a real object, and in RTI view (**Figure 8**), which provides the possibility to explore the seal under various lighting conditions. On RTI applied to Byzantine Sigillography, see the paper by Schaeben and Catalano in this volume (Schaeben and Catalano 2024).

Figure 7: 3D view of a seal (SB-1, Robert Feind Collection).

Figure 8: RTI views of a seal (SB-1, reverse, Robert Feind Collection).

§ 59 The third menu item will be linked to the project's information page, which may also include some manuals and helpful information. In addition, we will also include a site notice, a privacy protection statement, the licence statements, and similar information that is necessary in general, while making students aware of the basic copyright aspects of online publishing.

§ 60 Apart from advertising the research results of the seminar, the website fulfils the other two components of the action, as it provides an infrastructure for teaching Byzantine Sigillography and informs the scholarly community and the public about the potential of Byzantine Sigillography. The different texts that will be uploaded on the website can serve as an easy-to-access reference tool on Byzantine Sigillography. The Byzantine bibliographic database section, in particular, could include in future all publications of Byzantine lead seals and thus act as a major reference tool for the whole discipline. The digital exhibition of seals itself can offer not only ways and ideas to museologists on how to present such objects, but can also be used in courses of Byzantine history and culture as teaching materials for students. The latter will be accomplished by the fact that, unlike other digital or printed exhibitions of Byzantine lead seals, we will offer to the user a 3D viewing tool. Furthermore, unlike physical exhibitions, the advantages of a digital exhibition are that they can last indefinitely and can be rectified or enriched in the future.

§ 61 Eventually, thanks to the successful completion of this course, we hope and intend its repetition every two years in the future, each time with a different main theme, such as about the contribution of sigillography to the prosopography or the administration of Byzantium. In this way, the digital exhibition of seals and

the pertaining texts will be enriched, thus eventually making the website an online handbook to Byzantine Sigillography that can address students, experts in the field, the wider scientific community, and the interested public.

5. Sustainability of instructional materials and teaching outcomes

§ 62 All instructional materials currently under development within the scope of the DigiByzSeal and DiBS projects, akin to those produced within the EpiDoc community, adhere to an Open Educational Resources (OER)-enabled pedagogical approach. This signifies that these materials are covered by copyright licenses that grant authorization for individuals to engage in the 5R activities: retaining, reusing, revising, remixing, and redistributing, as outlined by Wiley and Hilton (Wiley and Hilton 2018, 134–135). Beginning in late 2024, these materials will be available through a customized version of edulabs, a platform designed to facilitate innovative teaching methods that enhance digital literacy (edulabs 2018). In the specific case of the teaching and self-training materials produced within the two aforementioned projects, they will be stored in ORCA.nrw, the online portal for digitally enhanced teaching and learning at universities (ORCA 2024) and published, whenever possible, under a Creative Commons-BY license.

6. Conclusion

§ 63 In this paper, we have addressed various issues relating to the pedagogical aspects of teaching Byzantine Sigillography within the context of the Digital Humanities, stemming from experiences gained in ongoing projects at the Department of Byzantine and Modern Greek Studies at the University of Cologne.

§ 64 In the first case study, the focus was on instructing a diverse audience comprised of students and researchers in Byzantine studies and related disciplines, as well as curators and professionals involved in cultural heritage in XML-based technologies, specifically SigiDoc. In the second case study, an international seminar was conducted with the aim of preparing a digital exhibition centred around Byzantine seals and their significance in the study of Byzantine history and civilization.

§ 65 In both instances, we have observed a growing interest within the community of Byzantinists, which, we hope, has arisen from an awareness of the necessity of a digital transformation in the discipline, with the goal of fostering a new generation of sigillographers.

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The authors have no competing interests to declare.

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