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QOMARUDDIN MANUSCRIPT GALLERY: A NEW PARADIGM FOR PRO-SANTRI DIGITAL PHILOLOGY IN THE NUSANTARA REGION

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Abstract

Nusantara manuscripts are an invaluable pillar of the nation's collective memory, yet their representation in digital spaces often faces significant challenges. Large-scale digitization projects, while crucial for preservation, frequently produce incomplete and erroneous metadata and fail to represent the complexities of codicological objects like bundles or composite codices. The physical fragility of manuscripts, necessitates modern preservation efforts, but their implementation has yet to fully embrace the potential of digital humanities. Furthermore, the interfaces of existing digital repositories are often not designed to meet the needs of the manuscript's primary inheritor community, such as the santri, who possess unique scholarly traditions. This article examines these issues through a case study of hundreds of Islamic manuscript collections at the Pondok Pesantren Qomaruddin Sampurnan, Gresik, which have been digitized by several international institutions. As a critical and solutions-oriented response, this research proposes the "Galeri Manuskrip Qomaruddin," a web application prototype built on three pillars: (1) In-depth recataloging based on codicological principles and rich descriptive metadata standards, (2) User-Centered Design with a "pro-santri" philosophy that prioritizes accessibility and contextual relevance for the pesantren community, and (3) The innovative "commentary" interactive feature that transforms static archives into a dynamic and collaborative space for social philology. Thus, the Qomaruddin Manuscript Gallery not only functions as a better digital archive but is also proposed as a new paradigm that can be replicated for the future of digital philology in Indonesia, one that synergizes the meticulousness of philological methods, critical digital humanities practices, and deep community involvement.

Keywords: Philology; Nusantara Manuscripts; Digitalization; Digital Humanities; Islamic Boarding School; User-Centered Design; Social Philology.

INTRODUCTION

Archipelagic manuscripts are invaluable artifacts, serving as pillars of a nation's collective memory and reflecting a profound depth of intellectual, cultural, and historical richness.[1] More than mere texts, these manuscripts act as "beacons of civilization," imbued

[1] S. O. Robson, *Principles of Indonesian Philology*, Working Papers (Foris Publications, 1988), https://cir.nii.ac.jp/crid/1970867909885572367.

with positive messages and noble values passed down through generations.[2] Often over fifty years old, the physical condition of these manuscripts is highly susceptible to deterioration.[3] With the rapid advancement of technology, digitization has emerged as a modern and effective approach to preserving this cultural heritage, ensuring that the information contained within remains accessible and enduring for the long term.[4]

Despite various large-scale digitization initiatives ranging from those by national institutions like the National Library of the Republic of Indonesia (Perpusnas) through its Khastara application, to international projects such as DREAMSEA (Digital Repository of Endangered and Affected Manuscripts in Southeast Asia), which has contributed hundreds of thousands of records of ancient manuscripts,[5] their implementation still faces significant challenges. These challenges, as identified by Makmur et al.[6], can be categorized into three critical gaps. First, there is a technical-philological gap: digitization projects often produce incomplete or erroneous metadata, failing to represent the complexity of codicological objects such as manuscript bundles or codex compositus.[7][8][9] This superficial representation compromises authenticity and hinders in-depth scholarly analysis. Second, there is an access-relevance gap. Existing digital repository interfaces are generally not designed with the needs of the primary her communities such as students (santri) in Islamic boarding schools (pesantren) in mind.[10] Consequently, the utilization and adoption of these digital resources remain limited and lack contextual relevance. Third, digital philology remains trapped within

[2] E. G and Annabel Teh Gallop, "Golden Letters: Writing Traditions of Indonesia," *Journal of the American Oriental Society* 120, no. 3 (2000): 497, https://doi.org/10.2307/606053.
[3] Testiani Makmur et al., "Tantangan Utama Preservasi Naskah Kuno Berbasis Digitisasi," *Berkala Ilmu Perpustakaan Dan Informasi* 20, no. 1 (June 2024): 193–209, https://doi.org/10.22146/bip.v20i1.9321.
[4] *KONSERVASI NASKAH MANUSKRIP SEBAGAI UPAYA MENJAGA WARISAN BUDAYA BANGSA DI ERA INDUSTRI 4.0 | JUPITER*, n.d., accessed November 9, 2026, https://journal.unhas.ac.id/index.php/jupiter/article/view/11311?utm_source=chatgpt.com.
[5] Oman Fathurahman, "A New Light on the Sufi Network of Mindanao (Philippines): The Sheikh Muhammad Said Manuscript Collection," *Indonesia and the Malay World* 47, no. 137 (January 2019): 108–24, https://doi.org/10.1080/13639811.2019.1568753.
[6] Makmur et al., "Tantangan Utama Preservasi Naskah Kuno Berbasis Digitisasi."
[7] annabel gallop, "Annabel Gallop - The British Library," accessed November 9, 2026, https://bl.academia.edu/AnnabelGallop.
[8] Erik Kwakkel, *Towards a Terminology for the Analysis of Composite Manuscripts*, 2002, https://doi.org/10.3406/galim.2002.1572.
[9] Lea D. Pokorny, "The Genesis of a Composite: The Codicology of AM 239 Fol.," *Gripla* 34 (December 2023): 173–206, https://doi.org/10.33112/gripla.34.6.
[10] Dinata Firmansyah, Ilzamudin Ma'mur, and Agus Gunawan, "Pendidikan Islam Di Seluruh Dunia: Komunitas Dan Keberagamannya," *Jurnal Darussalam: Jurnal Pendidikan, Komunikasi Dan Pemikiran Hukum Islam* 16, no. 2 (April 2025): 18–38, https://doi.org/10.30739/darussalam.v16i2.3644.

a static archival paradigm, where the primary focus is limited to media conversion, storage, and display, failing to embrace dynamic, collaborative models.[11,12]

This research aims to critique current practices in digital philology and propose an alternative model capable of addressing these gaps. A case study of the hundreds of manuscripts held at the Qomaruddin Islamic Boarding School (Pondok Pesantren Qomaruddin) in Gresik which have been digitized by various institutions will serve as the foundation for testing the validity of this proposal. By presenting the "Qomaruddin Manuscript Gallery" as a prototype, this research seeks to demonstrate how a holistic approach can synergize the rigor of philological methods,[13,14] critical digital humanities praxis,[15] and deep community engagement. This creates a new, replicable paradigm for the future of digital philology in the Indonesian archipelago. This approach termed "philology plus" by Oman Fathurahman integrates philology with other disciplines, including Islamic studies and technology.

RESEARCH METHOD

This study employed a qualitative research method with a case study approach, following Creswell's perspective, to examine digital manuscript preservation and development at Pondok Pesantren Qomaruddin, Sampurnan, Gresik, East Java. Data were collected through observation of existing digital manuscript repositories, interviews with relevant stakeholders, including manuscript researchers, pesantren representatives, and santri, and documentation of manuscript collections, catalogues, metadata, and institutional records. The research used primary data obtained from observations and interviews, supported by secondary data from scholarly literature, digital repositories, and relevant institutional documents. Data analysis involved data reduction, data presentation, and conclusion drawing, focusing on identifying problems related to codicological representation,

[11] Holley R. P., "Crowdsourcing: How and Why Should Libraries Do It? - E-LIS Repository," accessed November 9, 2026, https://eprints.rclis.org/14360/.
[12] Horst Kremers, ed., *Digital Cultural Heritage* (Cham: Springer International Publishing, 2020), https://doi.org/10.1007/978-3-030-15200-0.
[13] Siti Baroroh Baried, *Pengantar teori filologi* (Fakultas Sastra Universitas Gadjah Mada, 1994).
[14] "PENGKAJIAN SASTRA-SASTRA TRADISIONAL INDONESIA," Catatan Nusantara, May 24, 2021, https://www.catatannusantara.com/pustaka/stqm7292o3zk969u6x4dxtno1b2tgl-27hdc-ncs3g-6ftw6-admja-a2a5a-h3tfa-2x9w5-gzama-pw4c3-lhzmj-t9thg-4mbtk-w5jza-3jtl7-e8sjc.
[15] Sophie Hénon, "Fakes or Fancies? Some 'problematic' islamic manuscripts from South East Asia," Billet, *Les carnets du CASE*, May 3, 2016, https://doi.org/10.58079/m8ja.

metadata completeness, digital accessibility, and community participation. The findings were subsequently analyzed using codicological principles, TEI and METS/MODS metadata standards, and the User-Centered Design (UCD) approach to formulate the Galeri Manuskrip Qomaruddin prototype, integrating in-depth recataloguing, a pro-santri interface, and collaborative manuscript studies through the Stream feature.[16]

RESULTS

A. Critical Analysis of Existing Practices

1. Problematic Codicological Metadata

The digitization of manuscripts often focuses solely on producing high-resolution digital images, failing to replicate one of the most crucial aspects of the physical object itself: its codicological structure. As Robson explains, philology encompasses more than just textual criticism; codicological study—the science of manuscripts as physical objects—serves as an essential foundation.[17] Manuscripts, particularly those from the traditions of the Malay Archipelago (Nusantara), often do not consist of a single, unified text; rather, they are collections of various texts or fragments bound together into a "bundle" or codex compositus.[18] These composite objects possess complex historical layers that reflect their unique histories of production, ownership, and usage.[19] Unfortunately, many existing digital manuscript databases yield unsatisfactory results when searched based on these historical layers—largely due to rigid data models that equate a physical volume with a single, monolithic work.[20]

This limitation does not stem from a lack of metadata standards, but rather from a lack of depth in their application. Standards such as the Text Encoding Initiative (TEI) and the Metadata Encoding and Transmission Standard (METS)—along with sub-schemes like the Metadata Object Description Schema (MODS)—provide a wealth of descriptive elements. The TEI, for instance, includes the `msDesc` (manuscript description) and `physDesc` (physical description) elements, which allow for the documentation of physical details such

[16] John W. Creswell et al., "Qualitative Research Designs: Selection and Implementation," *The Counseling Psychologist* 35, no. 2 (March 2018): 236–64, https://doi.org/10.1177/0011000006287390.
[17] Baried, *Pengantar teori filologi*.
[18] G and Gallop, "Golden Letters"; Kwakkel, *Towards a Terminology for the Analysis of Composite Manuscripts*.
[19] Massimiliano Bampi and Stefanie Gropper, eds., *Medieval Translatio: Interdisciplinary Studies in the Translation and Transfer of Language, Culture, Literature* (De Gruyter, 2024), https://doi.org/10.1515/9783111218045.
[20] Patrick Andrist, "Toward a New Generation of Databases and Database Applications for Describing Ancient Manuscripts," *Digital Scholarship in the Humanities* 36, no. Supplement_2 (October 2021): ii9–16, https://doi.org/10.1093/llc/fqab022.

as materials, place of origin (origPlace), and dimensions. In practice, however, the application of these standards is often superficial and fails to fully capture the complexities of a codex compositus—including variations in script, illuminations, and the physical history essential for in-depth study.[21]

This limitation creates a disparity between preservation goals and research needs. Large-scale digitization projects, such as those funded by DREAMSEA and EAP, operate with a high degree of urgency to rescue manuscripts from the threat of physical deterioration.[22] While this focus on quantity and speed is vital for physical preservation, it often comes at the expense of metadata quality and codicological representation. Although the resulting data preserves the images, it becomes less useful for rigorous philological analysis, as it lacks the crucial context of the manuscript as a dynamic cultural object. Consequently, these repositories function merely as "static digital archives" that preserve only the "image" of a manuscript, rather than its "meaning."

2. A Comparative Study of Major Digital Repositories

To understand the existing challenges, it is essential to analyze key digital repository practices at both national and international levels. A paradigmatic inconsistency often emerges between the goals of "preservation and maximum access" and the actual technical implementations and institutional policies in place.[23]

The National Library of Indonesia (Perpusnas), through its "Khastara" website, represents a significant national initiative for managing manuscript heritage. With a vision of "1 Digital Data of Nusantara Manuscripts," the site offers a diverse digital collection. Khastara also features a "Daulat Naskah Kuno" (Ancient Manuscript Sovereignty) initiative, which allows the public to register manuscripts in their possession—a gesture reflecting a commitment to community engagement. Nevertheless, Khastara faces certain limitations; not all ancient manuscripts have been digitized, and various technical hurdles have been reported. Furthermore, the search functionality is not described in detail, and access policies for some collections are restricted to "view only," which limits their utility.

DREAMSEA—an international collaborative project between PPIM UIN Jakarta and the University of Hamburg—is recognized as an exceptional endeavor, having digitized

[21] Pokorny, "The Genesis of a Composite."
[22] Makmur et al., "Tantangan Utama Preservasi Naskah Kuno Berbasis Digitisasi."
[23] gallop, "Annabel Gallop - The British Library."

thousands of manuscripts across Southeast Asia. The project is highly regarded for the quality and depth of its metadata. Its digital repository, hosted on the HMML Cloud, offers search options based on country, city, collection, title, subject, author, language, and script. Even so, detailed information regarding these search features and metadata is not always transparently available on the public-facing website, making it difficult for users to fully grasp the repository's capabilities.

By way of comparison, international repositories such as the British Library and the Wellcome Collection exhibit an interesting inconsistency. The British Library provides an online catalog of over 2,000 digitized manuscripts and archival documents; however, these collections are limited to "view only" with no option for downloading, which restricts access. On the other hand, the British Library offers a “Catalogue of Illuminated Manuscripts” that allows for the downloading of images and their reuse under a Creative Commons license, highlighting a disparity in access policies. In contrast, the Wellcome Collection stands out as a positive example by adopting a more progressive approach—incorporating the International Image Interoperability Framework (IIIF) and Agile development processes—while also making catalog data and digital items available to developers and researchers via open APIs.

These limitations, whether intentional or otherwise, create barriers that distance manuscripts from the communities to which they belong. Users who are unfamiliar with large-scale repositories, or those seeking specific codicological details, often encounter frustration—a situation that ultimately restricts the utilization of this cultural heritage.

3. The Context of *Santri* as Key Users

The manuscript collection at the Qomaruddin Islamic Boarding School (Pondok Pesantren) in Sampurnan, Gresik, serves as a concrete example of the rich intellectual heritage of the Indonesian archipelago. This collection comprises works by local scholars, written in various languages and scripts—including Arabic, Jawi, and Pegon—dating back to 1740. The digitization of these manuscripts has been a multi-stakeholder collaboration involving the Center for Islamic Boarding School Studies (PSP) at IAI Qomaruddin, DREAMSEA, the British Library’s Endangered Archives Programme (EAP), Nahdlatut Turots, and the National Research and Innovation Agency (BRIN). The involvement of these diverse entities underscores the significance of the collection for both preservation and research.

Students within the Islamic boarding school system—known as *santri*—are the primary inheritors of these manuscripts.[24] Their access requirements differ from those of Western academics. Beyond mere digital images, *santri* require tools that facilitate practices such as *tahqiq* (textual verification or analysis), *tadarus* (collaborative study), and discussions rooted in the scholarly traditions of the *pesantren*.[25] Current digitization approaches often overlook these contextual needs, as the provided interfaces and features do not align with the workflows or terminology employed by this community. This highlights that an effective digital solution must be built upon a profound understanding of the needs and traditions of the community that will utilize it.

B. Three Pillars of the New Paradigm for the Qomaruddin Manuscript Gallery

As a critical response to the aforementioned challenges, this study proposes the "Qomaruddin Manuscript Gallery" as a prototype built upon three core pillars, aiming to establish a new paradigm for digital philology. This approach consciously positions the user—in this case, the pesantren (Islamic boarding school) community—at the heart of the entire process, a philosophy known as User-Centered Design.[26]

1. First Pillar: Recataloging Based on Codicology and Rich Metadata Standards

The first pillar focuses on fundamental improvements to the processes of cataloging and metadata representation. The Qomaruddin Manuscript Gallery project adopts a more extensive and flexible implementation of TEI and METS/MODS metadata standards. This re-cataloging process is guided by the principles of codicology—the study of the physical characteristics of manuscripts and textology, which focuses on the content of the text.[27] Rather than merely recording basic information, this approach meticulously documents the codicological details of each manuscript, including its materials, layout, illuminations, and physical history—all of which reflect its status as a codex compositus.[28] For instance, in cases where a single physical volume contains multiple manuscripts, the gallery creates separate

[24] "E-Book-NAA-2019-Sastrawan-Santri.Pdf," accessed November 9, 2026, https://www.nusantarainstitute.com/wp-content/uploads/2020/02/E-Book-NAA-2019-Sastrawan-Santri.pdf.
[25] Mar'atus Syarifah, "Karakteristik Manuskrip Mushaf Al-Qur'an Koleksi Pondok Pesantren Sembilangan: Kajian Kodikologi" (undergraduate, UIN Sunan Ampel Surabaya, 2025), https://digilib.uinsa.ac.id/id/eprint/76090/.
[26] "Background | Accessibility in User-Centered Design | Just Ask: Integrating Accessibility Throughout Design," accessed November 9, 2026, http://www.uiaccess.com/accessucd/background.html.
[27] Fathurahman, "A New Light on the Sufi Network of Mindanao (Philippines)."
[28] Pokorny, "The Genesis of a Composite."

metadata entries for each individual "bundle" or manuscript, documenting the history and characteristics of each component, in line with established scholarly recommendations.[29]

The following table presents a comparison between the application of conventional metadata standards and the proposed in-depth approach, visually highlighting how a more flexible and comprehensive usage can overcome existing limitations in representing composite manuscripts.

Table 1. Comparative Analysis of Manuscript Metadata Standards and the Proposed Qomaruddin Manuscript Gallery Approach

Metadata Standards	Related Elements	Bundle Representation Capability	Limitations in General Application
TEI (Text Encoding Initiative)	msDesc, physDesc, msContents, origDate, origPlace	Adequate, with a hierarchical structure	Its implementation is often superficial and does not cover all complex codicological details.
METS/MODS (Metadata Encoding and Transmission Standard/Metadata Object Description Schema)	dmdSec, amdSec, structMap, fileSec	Adequate, through the mapping of physical structures	Data models are often too rigid and insufficiently flexible to accommodate unconventional document structures.
Qomaruddin Manuscript Gallery Approach	Extended combination of TEI/MODS	Highly effective, with unit-by-unit representation	Requires greater resources, philological expertise, and time.

[29] Kwakkel, *Towards a Terminology for the Analysis of Composite Manuscripts*; Andrist, "Toward a New Generation of Databases and Database Applications for Describing Ancient Manuscripts."

The significance of this approach lies in its ability to transform raw digital data into scientifically rich data (Eleftherohorinou et al., 2017; Kreutel, 2024).[30] By recording the historical layers of a manuscript, the Gallery not only preserves images but also validates the manuscript as a dynamic cultural object and a reliable research tool.

2. Second Pillar: Pro-Student (Pro-Santri) User-Centered Design (UCD)

The second pillar is the application of the User-Centered Design (UCD) philosophy, framed through a "pro-santri" (student-centric/devoted to santri) approach. UCD is a methodology that places the user experience at the core of the design process, ensuring that the resulting products are relevant, intuitive, and address genuine needs. In the context of cultural heritage, UCD focuses on creating intuitive interfaces and compelling narratives to enhance the user experience.[31]

The Qomaruddin Manuscript Gallery implements UCD directly by involving the santri community at every stage of development. Through workshops and user testing—as proposed by Caria & Mathiak the project team is able to understand the unique requirements of the santri, such as the ability to search for texts written in Jawi and Pegon scripts, as well as features that support their *tahqiq* (critical textual analysis) and *tadarus* (collaborative scriptural study) practices. This approach transforms digital manuscripts from mere "protected" objects into relevant, "living" intellectual tools within their scholarly praxis. By empowering the santri as co-creators in the design process, the project not only produces a superior outcome but also fosters a sense of ownership and engagement, thereby addressing the community-related challenges identified earlier.[32]

3. Third Pillar: Social Philology through the "Stream" Feature

Traditional philology is often viewed as a discipline centered on the individual philologist, one that isolates texts from their social contexts. In contrast, modern philology—particularly within the digital humanities—is shifting toward more collaborative practices,

[30] "Metadata Management and Materialization of Composite Documents in a Digital Library | Request PDF," *ResearchGate*, ahead of print, June 26, 2026, https://doi.org/10.17706/IJCCE.2017.6.2.91-103.
[31] Badrus Shalih, "FROM KITAB KUNING TO CHATGPT: AUTHORITY, AUTHENTICITY, AND PESANTREN PEDAGOGY IN THE AGE OF GENERATIVE ARTIFICIAL INTELLIGENCE," *Hunafa: Jurnal Studia Islamika* 23, no. 1 (July 2026): 23–41, https://doi.org/10.24239/jsi.v23i1.952.
[32] Nurfarahani Norman Anuar and Mohd Kamal Othman, "Integrating User-Centered Design with the Agile Software Development Methodology for a Cultural Heritage Information System," *Interaction Design and Architecture(s)*, no. 45 (August 2020): 207–25, https://doi.org/10.55612/s-5002-045-009.

often termed "social philology" or "collaborative philology".[33] Projects such as Wikisource Loves Manuscripts and Transcribe Bentham have demonstrated the immense potential of community-driven cooperation in the transcription and processing of digital manuscripts.[34]

The Qomaruddin Manuscript Gallery proposes an innovative "Stream" feature, which serves as the core of this social philology approach. The Stream functions as an interactive platform, transforming a static repository into a dynamic, collaborative space. Through the Stream, users can engage in the crowdsourcing of transliteration and transcription—a method proven successful in similar initiatives like FromThePage. Furthermore, the feature facilitates inline annotation and discussion on each manuscript page, with every contribution recorded within the metadata. This effectively democratizes philology by acknowledging that knowledge regarding manuscripts resides not only in major libraries but also within the communities that serve as their custodians and heirs.[35]

C. Case Study: Qomaruddin Manuscript Gallery

1. History and Context of the Collection

The manuscript collection at the Qomaruddin Islamic Boarding School (Pondok Pesantren Qomaruddin) serves as a significant repository, reflecting a rich tradition of Islamic literacy (Ridlo, 2022). This collection comprises works by local scholars, written in Arabic, Jawi, and Pegon scripts, dating back to the 18th century. The digitization of these manuscripts has been a multi-stakeholder collaboration involving the Center for Islamic Boarding School Studies (Pusat Studi Pesantren/PSP) at IAI Qomaruddin, DREAMSEA, the British Librarythrough its Endangered Archives Programme (EAP1564), Nahdlatut Turots, and the National Research and Innovation Agency (BRIN). The involvement of these various entities underscores the importance of the collection for both preservation and research.

2. Practical Application and Initial Results

Although still in the prototype stage, the Qomaruddin Manuscript Gallery has demonstrated the successful application of these three pillars. Regarding re-cataloging, the

[33] Sheldon Pollock, "Future Philology? The Fate of a Soft Science in a Hard World," *Critical Inquiry* 35, no. 4 (January 2009): 931–61, https://doi.org/10.1086/599594.
[34] Martin Moyle, Justin Tonra, and Valerie Wallace, "Manuscript Transcription by Crowdsourcing: Transcribe Bentham," *LIBER Quarterly: The Journal of the Association of European Research Libraries* 20, nos. 3–4 (February 2011): 347–56, https://doi.org/10.18352/lq.7999.
[35] Rian Bimo Ankhal, Muharman Lubis, and Hanif Fakhurroja, "SYSTEMATIC LITERATURE REVIEW ON DIGITAL TRANSFORMATION IN THE ORGANIZATIONAL BUSINESS," *Multidisciplinary Indonesian Center Journal (MICJO)* 3, no. 1 (January 2026): 1616–30, https://doi.org/10.62567/micjo.v3i1.2059.

project meticulously documents each manuscript bundle as a distinct metadata unit—even when physically bound within a single volume—in line with established scholarly recommendations.[36] This approach ensures that the historical integrity of each manuscript is preserved digitally.

In terms of a santri-oriented User-Centered Design (UCD), the gallery's interface is tailored for ease of use by the pesantren (Islamic boarding school) community. A search feature allows users to input keywords using the Jawi or Pegon scripts, ensuring relevance to their specific scholarly tradition. The navigation is designed to be intuitive, minimizing the technical barriers often encountered in large-scale repositories.

Finally, the "Stream" feature has been tested in initial demonstrations. This feature enables santri or researchers to collaboratively transliterate a page, with each entry saved as a separate layer of metadata. Discussions concerning annotations or inquiries can take place directly on the relevant page, creating a digital footprint of philological activities that, historically, have often gone unrecorded.

DISCUSSION

The Qomaruddin Manuscript Gallery model challenges the dominant "digitization-as-preservation" paradigm by proposing a "digitization-as-activation" framework. This perspective views digital manuscripts not as static copies, but as living objects that are continuously studied and enriched by a community. This approach directly addresses criticisms of rigid databases and static archival models, aligning with the broader concept of collaborative philology.

Given the success of this prototype, the Qomaruddin Manuscript Gallery model holds significant potential for replication across pesantren (Islamic boarding schools) and other communities throughout Indonesia, which house thousands of as-yet-untouched manuscript collections. This model could serve as a blueprint for creating a digital ecosystem that not only preserves cultural heritage but also ensures it remains relevant and functional for the communities that inherit it.

The implementation of social philology facilitated by features such as the "Stream" fundamentally transforms the role of the philologist. With digital tools handling time-

[36] Andrist, "Toward a New Generation of Databases and Database Applications for Describing Ancient Manuscripts"; Kwakkel, *Towards a Terminology for the Analysis of Composite Manuscripts*.

consuming transcription tasks, philologists can shift their focus from "transcription laborers" to "knowledge curators". Their role evolves into that of a facilitator, analyst, and storyteller, deepening the understanding of both the manuscripts and their contexts. This transformation has the potential to revitalize the discipline of philology in the digital age, rendering it more inclusive, collaborative, and dynamic.

CONCLUSION

In conclusion, the Qomaruddin Manuscript Gallery project represents a valid case study for a new paradigm of digital philology based on three main pillars: in-depth recataloguing, pro-santri User-Centered Design (UCD), and social philology. This model addresses critical gaps in codicological representation, access relevance, and the static nature of existing digital archives. Based on these findings, several recommendations can be proposed for future development. First, the Qomaruddin Manuscript Gallery prototype should be further developed into a fully functional platform, supported by a more mature Stream feature and infrastructure capable of facilitating large-scale collaboration. Second, collaboration with other pesantren communities and manuscript owners should be encouraged to replicate this model, while adapting the UCD approach to the specific needs of each community. Third, the development of national metadata standards specifically designed to accommodate the complexity of composite Nusantara manuscripts should be promoted by incorporating relevant elements from TEI and METS/MODS. Finally, further research is needed to investigate the social and intellectual impacts of collaborative philology within pesantren education and the wider community.

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