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Revisiting Linking Early Geospatial Documents with Recogito

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Summary: Recogito is a web-based environment for collaborative semantic annotation. It is open source software, and provides support for working with either text or image documents, including those served via the IIF protocol. Originally, the tool has been designed for geographic annotation, i.e. the transcription, marking up and geo-resolving of maps and geographical texts (such as itineraries and travel reports) in the context of historical scholarship, e.g. to map or extract data from a source, or to prepare a digital edition. Over time, however, Recogito's feature set has grown to provide more general annotation functionality, broadening the scope for further potential application areas. Following up from an earlier article we published in e-Perimtron in 2015, in which we first introduced Recogito, this article looks back on the past four years of use and development. We present how Recogito has technologically evolved; how it has been applied in practice in different projects and for different purposes; and how a vibrant user community has sprung up around it that is shaping its further development. The paper also looks forward to some planned next steps, and sets out our future vision for Recogito's long-term development and sustainability.

Introduction

Recogito (<https://recogito.pelagios.org>) is an open source tool for semantic annotation: i.e. the marking up of text and images with references to controlled vocabularies. Recogito provides a personal workspace for users to upload, organize and share materials, and collaborate in their annotation and interpretation. Through an easy to use interface, users can: navigate digitised documents; create personal collections; transcribe toponyms on scanned maps; geo-resolve toponyms and textual place references by linking them to gazetteers; export their work in a range of data formats or display their results on interactive maps. Recogito also provides support for more general document annotation, such as adding free-form commentary or tags to text passages or image regions. Users can either work alone in a closed workspace, together as groups of collaborators, or in a public setting, using Recogito as a crowdsourcing platform. Recogito keeps track of version history and edit provenance, and can be customized with different name authorities for geo-resolution. It is also easy to apply Named Entity Recognition (NER) to texts, with the option to choose between different recognition engines and gazetteers. Recogito is being maintained and developed further under the umbrella and activities of the Pelagios Network (<https://pelagios.org>), an open, non-profit association advocating and enabling the production and use of linked open geo-data in the humanities and cultural heritage.

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We first introduced Recogito in a paper in e-Perimtron four years ago (Simon et al. 2015). Back then, Recogito had been developed as a tool for internal use by the project team of the *Pelagios 3* research project (Isaksen et al. 2014). By the end of the project, Recogito had attracted widespread community attention. This prompted us to seek additional funding to continue and expand its development. With renewed support from the Andrew W. Mellon Foundation, there was an opportunity to rethink the design of the whole platform from the ground up, taking into account what we had learned in *Pelagios 3*. The development of “Recogito 2.0” marks a complete rewrite of the system, with: a stronger focus on the user interface and its usability; support for general annotation and commentary in addition to geo-resolution; and a design that gives users the autonomy to create their own accounts and manage their own personal collections and collaborator groups (Simon et al. 2017). Officially released in December 2016, version 2 also included a number of technological additions, such as support for TEI-encoded text and the ability to work with images served via the IIIF protocol.

Since its release, Recogito has been in continuous use and development. It has progressed through another major and several minor releases (with the current release being v3.3), and earlier this year received the Digital Humanities Award for “Best Digital Humanities Tool or Suite of Tools”.¹ At the time of writing, our public instance at <https://recogito.pelagios.org> hosts more than 4,200 registered users and almost 3.5 million annotations, and receives between 200 and 2,000 user edits in a given day. In this paper, we look back over the past four years to present and reflect on Recogito’s evolution since our introductory paper, and to highlight some of the exciting work that scholars around the world have been doing using our tool. We also look forward to sketch out possible future steps in terms of functionality and architecture, before outlining how interested individuals and institutions can become involved in Recogito’s further support and development by joining the Pelagios Network.

Related Work

Annotation is well-recognized as a fundamental scholarly practice common across disciplines (Unsworth 2000). The idea of adding notes or marginalia to documents dates back at least as far as the medieval manuscript. But it is within the digital realm that annotation emerges as a powerful means of facilitating research, by enabling researchers to share and exchange knowledge, and collaborate in the analysis and interpretation of source material on a global level (Barker and Terras 2016). Annotation of place names and other kinds of geographic entities—such as peoples, regions or natural features—can be an important first step in the analysis of many different kinds of historical sources, in particular travelogues, histories, encyclopedias and, of course, maps. At the same time, the ever-increasing importance of the web as a medium for publication, curation and exchange of research data, along with the growing adoption of computational tools in the humanities (Bodard and Romanello 2016), calls for the development of tools and platforms that any researcher can use.

In recent years, significant progress has been made towards enabling semantic digitization of old maps—i.e. reproducing not just the map image, but capturing aspects of the content through transcription, vectorization (Iosifescu et al. 2013), annotation of symbology and toponymy (Chiang and Knoblock 2014, Höhn and Schommer 2016), and geo-referencing (Fleet et al. 2012). Automated ap-

¹ <http://dhawards.org/dhawards2018/results/>

proaches for implementing these tasks have become increasingly feasible, yet technical challenges remain high, especially when dealing with earlier, hand-drawn maps (Simon et al. 2014).

When we approached the task of semantically annotating a large corpus of maps and geographical texts in Pelagios 3, we felt that there was a distinct gap in the landscape of tools available to digital humanities scholars. We needed a tool that would, on the one hand, facilitate quick and efficient work by enabling a degree of automation but, on the other, emphasise manual intervention and strong editorial control to support the curation of quality data—all, of course, while being easy to use for a non-technical user. While environments that support manual annotation and editing tasks for digital humanists do exist, each has its own unique focus. Annotation Studio² and Hypothes.is,³ for example, represent two general purpose annotation environments, not focused on semantic annotation (and, in the case of Hypothes.is, designed to work with existing online content rather than resources uploaded and managed by the users themselves, as was a requirement for us). Digital Mappa⁴ is an open access Digital Humanities platform which includes annotation and linking functionality, but is designed for the creation and curation of digital scholarly publications. Another class of tools that Recogito is related to, and aims to complement rather than compete with, are transcription tools like FromThePage⁵ or Scripto.⁶ While (or because) the focus of these tools is different—namely the manual transcription of historical sources or the correction of OCR transcripts—we see significant benefit in their integration within a broader workflow. Allowing a researcher to transcribe from a source first, for instance, before moving to Recogito to perform NER, map toponyms collaboratively, and produce a TEI/XML edition for publication and storage in an institutional repository.

A Guided Tour of Recogito

While the core purpose of Recogito has remained largely unchanged from its initial idea in 2015—namely to provide an efficient environment to mark up texts and images with metadata about the places they refer to—its user interface, feature set, and technical architecture have undergone major revisions. New functionality has been added, from small productivity enhancements to major feature extensions, predominantly in response to direct feedback from our user community.

The component that has perhaps developed the most since Recogito’s early days is the workspace. The workspace is where all document management functionality resides. It is the personal environment to which users upload texts, images or data tables, import documents from IIF or CTS⁷ endpoints, and perform standard file management operations like creating folders, or moving or deleting documents. The workspace interface (Fig. 1) underwent a complete redesign in January 2019. It now includes drag-and-drop import; functionality to configure the metadata fields or annotation metrics that are displayed in the documents table; options to customize folder views with additional introductory “readme” text; and search functionality, both within a user’s own or shared documents, as well as within all public documents in the system.

² <https://www.annotationstudio.org/>

³ <https://web.hypothes.is/>

⁴ <https://www.digitalmappa.org/>

⁵ <https://fromthepage.com/>

⁶ <http://scripto.org/>

⁷ <http://cite-architecture.org/>

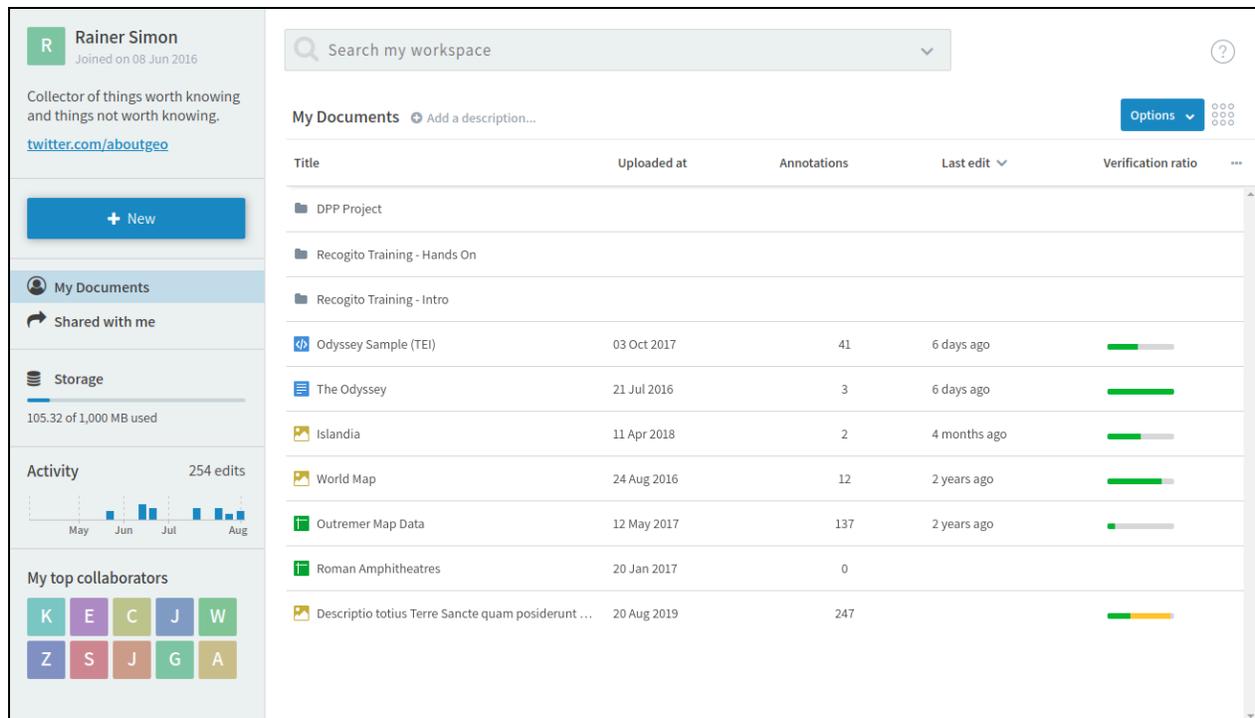


Figure 1: The personal workspace.

When opening a document from the workspace, Recogito provides several document views:

- **the annotation view** offers tools to make selections on the source document, and add elements (commentary, tags, gazetteer identifiers, etc.) that together comprise the annotations
- **the map** visualizes the geographical metadata associated with the document by means of gazetteer annotations
- **the annotation statistics page** visualizes metrics on user activity, entity resolution and tag use in the form of interactive charts and lists
- **the downloads page** lists the data export options available for the document
- **the document settings** allow document owners to manage properties such as the document’s descriptive metadata, gazetteer preferences, or sharing and collaboration modes.

The annotation view is where users will likely spend most of their time. It shows a reading view of the text or table, or a zoomable view in case of images (Fig. 2), and provides tools for selecting text passages, table rows or image areas, respectively. Texts can be annotated using standard mouse-selection behaviour, similar to that in any text processing software (i.e. clicking and dragging with the mouse or double-clicking a word). The image annotation view provides a number of selection tools, including basic point or rectangle selection, as well as specialized tools that have been added to support map-specific use cases, such as a tool for selecting a map symbol in connection with a toponym label. After making a selection, a popup window opens that allows the user to: add commentary and tags; reply to previous comments, if any; (in the case of images) add transcriptions; and optionally classify the highlighted section as a “place”, “person” or “event”. If a place classification is made, Recogito assigns it an automatic gazetteer match, marking it as “unverified”. The match will remain unverified until a user reviews and confirms it, using the inline mini-map (a one-click operation), or corrects it through the built-in gazetteer search. Including this type of quality control workflow—

while at the same time ensuring the process remains quick and efficient—has been a fundamental design principle for us, and a core feature from the very beginning of the system.

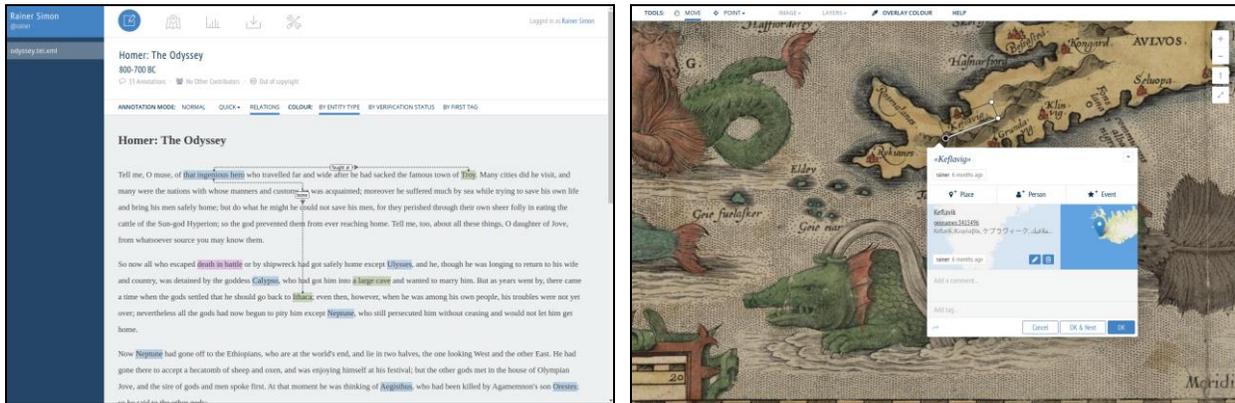


Figure 2: Text (left) and image annotation (right) views.

A key difference between the current version of Recogito and its first incarnation is a strong focus on supporting annotation as a fully collaborative process. Each single contribution to an annotation—comment, reply, tag, entity classification, gazetteer match—is individually associated with the user who made it, and the time it was made. This allows annotations to essentially function as “micro discussion threads” with multiple components and participants. Furthermore, because Recogito keeps an audit trail of additions and changes, it is possible to inspect the version history of the annotations, and revert the document to a previous state in time.

The map provides an overview of all places that have been identified in the document. Frequency of occurrence is symbolized by marker size—the bigger the marker, the more often the place appears in the document. Clicking a marker opens a popup showing the annotated text- or image-snippet (cf. Fig. 3), and enables the user to jump back directly to the corresponding section in the annotation view. The map also provides a number of colouring options in order to visualise different aspects of the annotation data. For example, it is possible to colourise the map based on document part, the tags used in the annotations, or the verification status of the gazetteer matches.

The annotation statistics interface provides charts and lists covering various annotation metrics, e.g. on editing activity, verification completeness, or the use of gazetteers and tags. These statistics can be useful, for example, in order for an instructor to survey progress in a team or among students, to spot outliers (such as the same toponym being assigned to different gazetteer identifiers), or to identify problem areas (such as a particular toponym being flagged for attention).

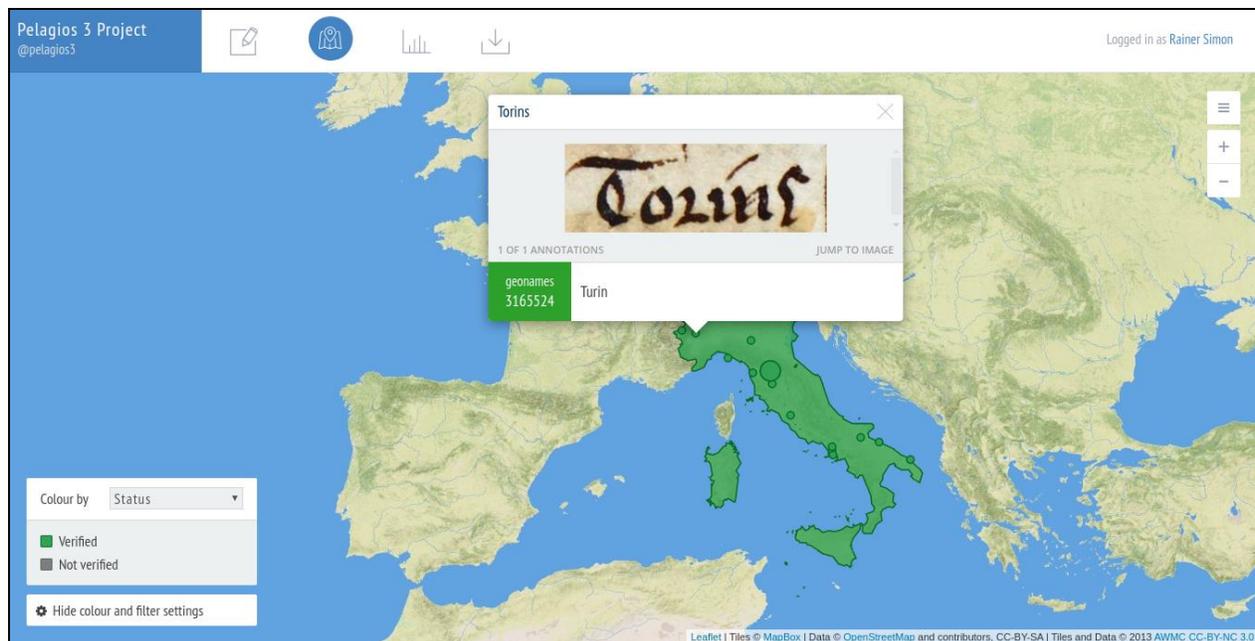


Figure 3: Map view.

The downloads page, while fairly minimal in appearance, perhaps reveals most about how our thinking has evolved over time in relation to Recogito’s role in the wider landscape of Digital Humanities research software. The initial version of Recogito offered only limited options for exporting data from the system—just enough to extract raw annotation data as a dump file, or for backup and restore purposes. A key goal when revisiting the system design was for Recogito to be more open, allowing users to pull in data from different sources as seamlessly as possible, enrich them with annotations, and then easily move their data out of Recogito into other environments for further analysis, processing or publication. We want Recogito to be able to function as one step in a pipeline of tools, in a scholar’s unique personal workflow. Extending the number of input and output channels, as well as catering for a wider range of user needs, skill sets and use cases, has been an important area of work. While such work can never be entirely finished, the downloads page represents an important step towards greater interoperability. The page lists a variety of available export options, depending on the format of the document (and the types of annotations it contains), and grouped by the nature of the export: “raw” annotation data can be downloaded in RDF, the native data format of linked data (following the W3C Web Annotation model),⁸ as well as in a simple spreadsheet form. For users primarily interested in reusing the geographical data, e.g. in GIS tools or web mapping frameworks, Recogito offers GeoJSON and KML exports, including a KML flavour specifically designed for compatibility with the DARIAH GeoBrowser.⁹ Text documents can be exported as TEI, with annotations embedded into the TEI markup. (In cases where the text was initially imported as a TEI/XML document, Recogito merges the annotations with the original TEI on the fly. If the text was uploaded as a plaintext .txt file, Recogito first applies a basic built-in XML template to transform the text to TEI.)

⁸ <https://www.w3.org/TR/annotation-model/>

⁹ <https://de.dariah.eu/geobrowser>

The document settings allow users to control various administration-related aspects of their documents, in particular, privacy and access privileges. Turning Recogito from what was effectively a single-user tool into a collaboration platform has been a core goal in the transition from version 1 to version 2. Users now have fine-grained control over which aspects of their work they share, and with whom. Should they choose to, they can share a document with specific users only, allowing them either read-only or write access. Alternatively, they can make documents fully open to anyone on the web. In this case, it is possible to control whether visitors will be able to access the full document content (i.e. text, image or table), or only the map and annotation data, which would be necessary, for example, if the content itself is under copyright. It is also possible to enable public write-access: in this case, Recogito can function as a crowdsourcing tool that allows any visitor to create annotations. Sharing settings can also be applied to document collections as a whole, in order to simplify group management, as in classroom work.

In recent months we have experimented with a number of extensions, which have aimed either to address specific feature requests from our community, or to enhance social collaboration, visibility and discoverability of public content in Recogito. An example of the former is “relationship annotation”,¹⁰ a feature in the text annotation view that enables users to draw a connecting arrow between two annotations, in order, say, to express a relation between a particular person and a place (cf. Fig. 2, left). Examples of the latter include: activity feeds that enable collaborators to stay up to date with the activity of a certain group of users or on a particular document; a recommendation system able to suggest “related documents”, based on similar metadata and the amount of correlation between the annotated entities; or the ability to create copies of another user’s public documents in your own workspace (akin to the process of “forking”, a well-known collaboration pattern in open source software development).

Scholarly Research with Recogito: Highlights

Recogito has had significant uptake among researchers, who are using it for different reasons and in different ways. Some are single scholars, working through a set of texts or images on their own, while others are part of larger groups, working collaboratively. Because soliciting and acting on feedback has been built into the way Recogito is developed and updated, we have been able to discover a great deal about how researchers are using our tool, and we realised early on that it is almost impossible to preemptively guess how researchers might use it, or what they might do with the resulting annotations. Being flexible and responsive to these various needs (such as making more storage space available to scholars working on large images, or incorporating unexpected feature requests) has resulted in us being able to build strong working relationships with scholars from a broad range of disciplines and regions. The four examples below illustrate some of the ways in which researchers are using Recogito to annotate complex documents, work with non-Latin alphabets, or integrate other tools and methods such as TEI and OCR.

The Lazarus Project is a multispectral imaging collaboration based at the University of Rochester which employs state-of-the-art technology to digitally recover faded, burned or otherwise damaged

¹⁰ <https://recogito.pelagios.org/help/relations>

documents (Davis and Zawacki 2019). Within the project, the team members responsible for processing the images need to effectively share their results, while the scholars deciphering the recovered texts need to be able to communicate (for example) which portions of the object need further processing, and create notes directly on the recovered digitized objects. The team commented on the inadequacy of workaround solutions (e.g. sharing via Dropbox, transcribing in standard word processing software), and stated that Recogito had solved both the sharing and the annotation problem for them. They also noted that Recogito's privacy control settings were invaluable for them, since many of their projects involved proprietary or sensitive objects, and are sometimes carried out under non-disclosure agreements.

Digging Into Early Colonial Mexico is a multi-disciplinary, collaborative project, run by the University of Lancaster (UK), the National Institute of Anthropology and History (Mexico), and the University of Lisbon (Portugal), which is developing methods and tools for mining data from textual and pictorial historical records (Murrieta-Flores and Bellamy, 2019). Their corpus is a part of the *Relaciones Geográficas de la Nueva España*, the results of an ordinance by King Philip II of Spain in 1577 to survey the Spanish realm, including the Viceroyalty of New Spain, which today covers the territory of Mexico and Central America. As well as needing to process some 2.8 million words in Spanish and 69 different indigenous languages, the *Relaciones* include over three dozen *pinturas*—plans of regions which depict a range of geographic information, such as streets, towns and villages, ports, coasts and islands. These *pinturas* are rich in both textual and pictographic information and their analysis requires a tool which is able to handle these simultaneously. Recogito offers the opportunity to do so, in a way which would not be possible without computational methods. The team also highlighted the value of Recogito's map view, which allows them to use both their own and other gazetteers to geographically locate the identifiable sixteenth-century places depicted on the *pinturas*, thereby highlighting the alternate ways in which space was conceptualised and represented by the creators of the paintings.

Kima¹¹ began in 2016 as a project which intended to lay the groundwork for a comprehensive, dynamic and interoperable gazetteer of historical place names in languages written in the Hebrew script (which includes Hebrew, Yiddish and Ladino). While the initial version of the Kima gazetteer provided a stable, shared digital reference for typonyms, it was also somewhat unbalanced: it consisted of substantial attestations from the ancient world and late antiquity, and a large number of modern and early modern catalogue-based attestations, but very few medieval sources. The breadth and variety of Kima was bolstered by the creation of a specialized Recogito NER plugin,¹² which enabled the automatic tagging of place names in Hebrew script texts. Making use of newly-digitised sources, OCR and OCR correction, and using Recogito to create annotations, Kima was able to add place names from two bilingual editions of medieval travel narratives. Both the Kima gazetteer and the Kima Hebrew NER plugin are now available to all users of Recogito.

Pelagios al Sur. While interest in the Digital Humanities as a scholarly field is growing in Latin America, the weakness and obsolescence of much of the digital infrastructures available to researchers is a significant hindrance. This prompted a group of scholars in Argentina to launch *Pelagios al*

¹¹ <https://geo-kima.org/kima>

¹² <https://github.com/dimidd/kimanager>

Sur. Both a project and a network of researchers, it aims to extend Pelagios's free and open source tools beyond the Euro-Asian bias of ancient world, medieval, and early modern studies. In a recent case study, they used Recogito to geographically annotate a corpus of early Argentinian texts, producing a TEI edition by enriching it with references to an early colonial Americas gazetteer. Recogito offered both researchers and students an opportunity to work collaboratively online, without the need for programming knowledge or infrastructure setup. The Pelagios al Sur community has launched a new initiative in 2019, with the aim of further extending TEI support in Recogito, specifically regarding the creation of digital scholarly editions.

Recogito in Teaching

Recogito is also being increasingly adopted in teaching. Over the last few years, it has proven to be useful in various pedagogical contexts, from entry level undergraduate classes, with students who are approaching the Digital Humanities for the first time, to specialised training workshops for academics and professionals in the GLAM sector.

As a free, easy to use, and visually appealing platform, Recogito has featured regularly in Digital Humanities schools, targeting researchers who want to improve their digital skills and explore new approaches. For example, at the Oxford Digital Humanities Summer School and the Linked Open Data Indian Summer School in Mainz, Recogito has been used as an intuitive and engaging introduction to Linked Open Data, by virtue of emphasising concrete applications over abstract concepts like Semantic Annotation, RDF or URIs. On other occasions, in workshops held in (among other places) Sofia, Cluj-Napoca, Ankara, Tbilisi, London and Athens, Recogito has been used as part of a "reference suite" of entry-level Digital Humanities tools which are easy to learn, but flexible enough to be used in a number of research contexts. The range of download options available in Recogito makes it highly suitable to be used in conjunction with other tools, enabling instructors to demonstrate possible workflows, and inviting attendees to find their own. The most popular digital pipelines suggested in these contexts have exploited, for example, the use of Recogito to mark up epigraphy according to the TEI Epidoc standard; the export of data from Recogito into the free GIS application QGIS; or the visualisation and analysis of Recogito "relation annotations" in the free network analysis application Gephi. Recogito has also proven useful for more advanced topics, such as within postgraduate modules that focus on digital geography and mapping. In the "Maps and Apps" module at King's College London, for example, Recogito is now regularly used as a means to introduce students to digital mapping, and to show the potential of digital gazetteers and Linked Open data technology in action.

At the same time, we have witnessed an increasing demand for Recogito in humanities syllabi as a tool to explore, visualise, discuss and analyse historical texts and documents. At the undergraduate level, and more likely with younger students, Recogito and the gazetteers it includes have proven to be an effective way of bringing historical sources (often in their original language, like ancient Greek or Latin) to life. The interaction with the text through the annotation interface and the map visualisations, and the active discovery of the locations of ancient places supports collaborative and engaged learning. It also prompts discussion on the evolution of places, from both a geographic and linguistic perspective. As argued by Mostern and Gainor (2013), an approach that combines historical sources with the spatial information they disclose helps students understand the weight of spatial dynamics when observing and analysing historical and cultural phenomena. In this way, Recogito provides an

intuitive and versatile means of exploring historical and literary documents, where annotation is used as a gateway to close and critical reading, both individually and collaboratively.

Using Recogito in the classroom also supports the acquisition of methodological skills, especially when used collaboratively. A popular way of using Recogito in teaching involves self-organised group work, during which students have to come up with meaningful research questions that they aim to answer by means of using annotations, relevant tags, and suitable map visualisations. This process forces students to think harder about their questions and approach, discuss challenges and insights with other members of the team, and constructively agree on a common line of research. The use of tags, in particular, often stimulates discussion about what categories to use, in which ways, and whether there are any exceptions, which encourages critical analysis of concepts. Even deceptively simple labels such as “place” and “person” were, for example, discussed at length by a group of students of Classics at a class at the University of Zagreb.

Recogito’s sharing options allow it to be used to submit official assignments, both individually or as a group. Each annotation has a specific author and time stamp, making the assessment straightforward and safe. The instructor can comment directly on each annotation, providing, potentially, very accurate feedback. Annotating documents in Recogito and producing related visualisations is currently used as an official way to assess students in at least three higher education institutions (University of London, Boğaziçi University, Istanbul and King’s College London).

One last aspect we want to highlight is that the use of Recogito—particularly in conjunction with other tools—teaches, indirectly, another skill that is crucial to the digital humanist: the ability to use digital resources creatively, sometimes stretching their scope, and the promotion of a student’s active role in the scholarly community. As demonstrated by undergraduate and postgraduate students in Historical Geography at Boğaziçi University, Istanbul, Recogito can be useful not only in the spatial analysis of historical documents, but also in support of the creation of entirely new resources. As a result of their efforts in annotating primary source Ottoman documents, they have also made the first steps towards building an Ottoman gazetteer.

Conclusion

In this paper we have presented an overview of Recogito, our open source platform for collaborative semantic annotation. Having reviewed its current state, and the past four years of development, we highlighted some ways in which scholars have applied it for their own research needs, and how it is being used in teaching. A key take-home point for us has been the huge variety—and the fair few surprises—in its usage: what features get used most (and how); what new functionality gets requested; and which use cases turn into “core interests” of the user community. To sum up what we have learned, we identify three key roles that have emerged for Recogito:

- As a *teaching tool*: Recogito provides an easy entrypoint, suitable for students making their first foray into the Digital Humanities. With a low barrier to entry, and a user interface that is easy to grasp, Recogito can teach basic digital skills before one turns to more complex data processing environments, or function as a gateway to close and critical reading of historical sources, especially in a collaborative setting. Out of the box, Recogito provides an accessible environment for going through the process of data preparation, marking up, and publishing a

minimal digital edition as the result of student assignments, without the need for specialised technical skills.

- As a *collaboration space*: Recogito makes it easy to share and discuss issues related to annotating a document within a team, even when globally dispersed or comprised of members with different roles and expertise (e.g. technical vs. domain specialists).
- For *extracting structured data*, as was our motivation for the development of Recogito in the first place: to serve as a platform for harvesting spatial metadata from historical sources, either to map documents and written accounts; for the purpose of building project-specific databases, specialist gazetteers, or editions; or to prepare data for participating in the LOD ecosystem, i.e. to publish data for others to query, harvest, remix and use in their own projects.

Throughout the development we have aimed to be as receptive to our users as possible. Their feedback has re-shaped our thinking (as well as our roadmap) on more than one occasion. As much as this has been a highly rewarding experience, we have also learned about some of the limitations of our system. For example, some projects have chosen to set up their own Recogito server, typically in order to work with a custom gazetteer, or to achieve closer integration with an existing repository. While we want to foster and support such custom installations more strongly, we are aware that Recogito currently has limits regarding the available technical interfaces for integration, customization and extension, branding and plugin development.

We firmly believe that an annotation tool, if it is to be in any way useful, ought not to be “all things to all people”. However, even within the fairly narrowly defined space of the Spatial Humanities, we have learned that designing a tool malleable enough to cover the breadth and depth of existing and potential use cases is extremely challenging. To secure Recogito’s longer-term strategic direction—as well as, critically, its sustainability—we believe two key things need to happen: one technical in nature, one social. In terms of technology, it will be crucial to further disaggregate the system architecture. This way, individual pieces of functionality will ideally become embeddable into other existing host environments and platforms; at the same time, a higher degree of separation will lower the bar for developers who want to customize, repurpose or extend specific parts of the system. On a social level, the recently founded Pelagios Network, a non-profit association that is open to individual and institutional members at no cost, now provides a framework through which a wider community of stakeholders can take a role in the future planning, open source development, and general support of Recogito, as well as curating the resources—training materials, gazetteers, technical guides, and so forth—that relate to it.

References

- Barker, E. and Terras, M. (2016) Greek Literature, the Digital Humanities, and Shifting Technologies of Reading. *Oxford Handbooks Online*, Oxford.
- Bodard, G. and Romanello, M. (2016) *Digital Classics Outside the Echo Chamber: Teaching, Knowledge Exchange and Public Engagement*. London, Ubiquity Press, ISBN 9781909188617.
- Chiang, Y. and Knoblock, C. (2014) Recognizing Text in Raster Maps. *Geoinformatica* 19 (1), 2014, pp. 1-27.
- Davies, H. and Zawacki, A. J. (2019) Collaboration and Annotation: Pelagios, Recogito and Multispectral Imaging of Cultural Heritage Objects. *EuropeanaTech Insight*, Issue 12.
- Fleet, C., Kowal, K. C. and Přidal, P. (2012) Georeferencer: Crowdsourced georeferencing for map library collections, *D-Lib Magazine*, 18 (11), 5, 2012.
- Höhn, W. and Schommer, C. (2016). RAT: A Referencing and Annotation Tool for Digitized Early Maps. *DH Benelux Conference 2016*, June 9-10, Luxembourg.
- Iosifescu, I., Tsorlini, A. and Hurni, L. (2013). Towards a comprehensive methodology for automatic vectorization of raster historical maps. *8th International Workshop on Digital Approaches to Cartographic Heritage*, Rome, 19-20 September 2013.
- Isaksen, L., Simon, R., Barker, E. and de Soto Cañamares, P. (2014) Pelagios and the Emerging Graph of Ancient World Data. *Proceedings of the 2014 ACM Conference on Web Science*. ACM.
- Murrieta-Flores, P. and Bellamy, K. (2019) Annotating 16th Century Maps with Recogito: The Geographic Reports of New Spain, *EuropeanaTech Insight*, Issue 12.
- Mostern, R., & Gainor, E. (2013). Traveling the Silk Road on a Virtual Globe: Pedagogy, Technology and Evaluation for Spatial History. *DHQ: Digital Humanities Quarterly*, 7(2).
- Simon, R., Pilgerstorfer, R., Isaksen, L. and Barker, E. (2014) Towards Semi-Automatic Annotation of Toponyms on Old Maps. *e-Perimtron*. Vol. 9, No.3, pp. 105-128.
- Simon, R., Barker, E., Isaksen, L. and de Soto Cañamares, P. (2015). Linking Early Geospatial Documents, One Place at a Time: Annotation of Geographic Documents with Recogito. *e-Perimtron* vol 10, no. 2, pp. 49-59.
- Simon, R., Barker, E., Isaksen, L. and de Soto Cañamares, P. (2017) Linked Data Annotation Without the Pointy Brackets: Introducing Recogito 2. *Journal of Map & Geography Libraries*, vol 13, 2017, issue 1, pp. 111-132.
- Unsworth, J. (2002) *Scholarly Primitives: what methods do humanities researchers have in common, and how might our tools reflect this?* Humanities Computing: formal methods, experimental practice. King's College, London, May 2000.