



# Digital Technology and the Future of Map History

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To cite this article: Martin Davis (2025) Digital Technology and the Future of Map History, Imago Mundi, 77:2, 221-225, DOI: [10.1080/03085694.2025.2567128](https://doi.org/10.1080/03085694.2025.2567128)

To link to this article: <https://doi.org/10.1080/03085694.2025.2567128>



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Published online: 25 Dec 2025.



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## Digital Technology and the Future of Map History

There can be little doubt that digital technology has dramatically changed almost all aspects of cartographic practice over the last 30 years. From the ways in which landscapes are surveyed to the design, production, dissemination, and use of maps; digital hardware, software and skills are now involved at every stage. The study of map history is not immune to these changes and, from the perspective of a university library, the changing methods and expectations of researchers and students are very apparent. Since the 1990s, and increasingly since the 2010s, many map collections have been occupied with digitising their holdings, often making them available online as photographs or georeferenced raster datasets. As this practice has transformed and continues to transform the accessibility of these collections, it is also opening possibilities for methods of digital scholarship to be applied in ways which would be difficult or impossible within the context of a library reading room, in which researchers consult physical maps on paper sheets or in volumes. The traditional desk-based study of physical maps still has its place, and enduring advantages, but no longer holds a monopoly on the study of the map—an evolution examined by Philip Jagessar in this Forum.

The near-universal production of current maps by digital means is also something that cannot be ignored by map historians. Today's born-digital maps constitute the historical cartography of the future and might reveal as much about today's world to future researchers as today's historical maps reveal to us about the past. Yet their value as cultural and historical documents has yet to be fully recognised. To the public, today's digital maps are merely 'maps,' and are usually the default and mainstream format for both reference and navigation, consulted in real time and not documented, while 'paper' maps now warrant the addition of a nostalgic prefix. Given their ubiquity, it is incumbent upon us to consider not only how such born-digital maps can be preserved for the future (as discussed in a previous *Imago Mundi* Forum),<sup>1</sup> but how the pervasiveness of these digital maps and their various formats might, too, alter approaches to the study of map history as, over time, they take their place within the narratives of the cartographic past. This brief discussion reflects on three areas in which digital mapping is already shaping the future of map history: production, accessibility, and scholarship.

### *Digitally Making Maps*

In reflecting on the influence that digital transformation is having on our discipline, it is difficult to ignore the fundamental changes in format taking place in relation to maps themselves. For centuries, maps have, for the most part, been produced on some form of static surface, whether a sheet, a volume, a globe, model or other physical object. Whereas large-format drawers and shelving suffice for storing much of the last millennium's cartographic output, no equivalent universal means of storage and preservation exists for 'digital maps,' an umbrella term which incorporates software, websites, mobile apps, games, augmented reality tools, datasets, videos, and image files, among other formats. As digital tools have improved rapidly to make this possible, the growth of digital literacy, in general, has been equally impactful, allowing more people to produce, edit, and interact with maps than ever before. The widespread ability for both experts and non-experts to produce maps which can change and evolve according to real-world conditions and the actions of their users will add significant complexity to their retrospective study.

Whereas other formats – such as written text – can also now be accessed digitally, their nature has arguably not been altered as fundamentally as for maps. When Jacques Bertin established his visual variables in 1967, it would have been difficult to foresee the raft of additional design controls cartographers would have at their disposal within a few decades.<sup>2</sup> From the addition of animation and moving images, to issues around resolution and screen size, the cartographer's toolkit and palette have undoubtedly expanded in the context of born-digital map production. The ability of future map historians to study the cartographic output of today rests heavily on the ability of libraries, archives, and other collections to find solutions to the challenges of preserving and providing access to changeable, iterative, and technology-dependent maps within the means of their finite resources. This task has been identified for at least 20 years, but remains a challenge.<sup>3</sup> The unabated risks of data obsolescence and inaccessibility pose significant threats to the future study of map history.

Another substantial change is emerging with the growing prevalence of Artificial Intelligence (AI) and the ever-improving ability of AI-based tools to

create credible maps, such as MapsGPT and the experimental tools being developed by Ordnance Survey to automate map styling and feature extraction.<sup>4</sup> Students of map history have long been able to situate a map within the context of its production, the individual or organisation responsible for its creation and often the means by which its source information was gathered. As well as muddying the waters of attribution, responsibility, and originality, the overall ethical implications of AI use also apply specifically to AI map creation. Issues around data privacy, the transparency of source data, accountability, and bias have all yet to be addressed within the context of cartography, as they have yet to be resolved more generally.

### *Digitally Accessing Maps*

The focus that many libraries have placed on the digitisation of their physical map collections is well justified. Making images of items available online reduces the need to travel to a particular location to consult the original material, opening collections to much broader global audiences. Since the 1980s, the parallel possibility of using digital accessibility as a means of preserving the original item has also been recognised. Clifford Lynch and Edwin Brownrigg made this connection in 1986, arguing that ‘it would provide the greatest return for the massive investment that will be needed to save our deteriorating collections.’ This argument still stands forty years later, although few in the mid-1980s could have foreseen the pace of advancement in both the scale and functionality of digital repositories, including those which incorporate maps. In making the case for digital images, Lynch and Brownrigg explained that ‘they can be duplicated and sent across the country to the requester via automated systems in a matter of minutes, or perhaps a few hours if the system is busy.’<sup>5</sup> Now, comprehensive, high resolution, and instantaneous global access has not only become possible, but is increasingly a basic expectation of library users. Large and well-presented online collections of digitised maps, such as those of the National Library of Scotland and David Rumsey, were among the first to meet these expectations capably, and many others are following suit.<sup>6</sup> The latter is now also making strides in utilising AI tools to enhance collections discovery, including by using text extraction methods.<sup>7</sup> The extent to which map digitisation makes it more difficult for curators to justify (to their institutions) the retention of physical collections is difficult to ascertain, and

will vary greatly depending on organisational pressures in different contexts.

The means by which global access can usefully contribute to work on decolonising library map collections is also worth further scrutiny. Opening digital map repositories to researchers in parts of the world to which the collections relate seems to be a positive step. However, publishing images of maps which present culturally sensitive content or problematic language (most commonly derogatory slurs relating to race) can create further issues. The National Library of Australia’s *Trove* platform anticipates and addresses user concerns by displaying ‘cultural advice’<sup>8</sup> addressed to Aboriginal and Torres Strait Islander people entering the website, alerting them to the presence of images and records of now deceased people on the website (Fig. 1). Ways of appropriately handling specific items which are potentially sensitive or offensive, for example, by publishing more detailed item-level descriptions or content warnings, are now the subject of frequent discussion between map curators. The Map Curators’ Group of the British Cartographic Society, for example, now holds regular online discussions on this topic.

In these and other complex cases, use by curators of the growing range of ‘storytelling’ tools available for online collections could benefit researchers, offering explanation and context to be published alongside map images, rather than only presenting users with an image and basic metadata, which usually suffices for most items. The fact that around sixty institutions now use the International Image Interoperability Framework (IIIF) standards for their online images of maps widens the possibilities for scholars to use IIIF-compatible tools, and viewers to bring together maps from different collections.<sup>9</sup>

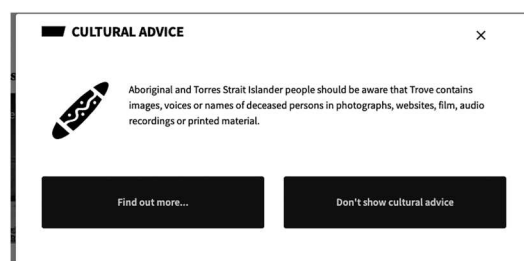


Fig. 1. A ‘Cultural Advice’ message appears when entering the *Trove* website, operated by the National Library of Australia (© National Library of Australia and Trove Partners).

### *Digitally Studying Maps*

There is now a wide range of possibilities for the study of historical maps on screen. Geographic Information Systems (GIS) software is well established as a tool in some academic fields, such as geography, with students at many universities encountering it at some point during their studies. The use of digitised map collections in a GIS setting can be especially useful within history and historical geography, where scanned maps from a relevant time period can be georeferenced and, if necessary, combined with other vector and raster datasets. The emergence of the 'spatial turn' in the humanities and social sciences over the last 20 years or so has seen student interest in GIS and digital mapping broaden to other disciplines, including literary studies, anthropology and archaeology, as these disciplines increasingly incorporate historical cartography into research agendas. At the Bodleian Libraries (University of Oxford), enquiries from students relating to maps come from all quarters of the University, and library staff are involved in teaching cartographic principles and techniques to interdisciplinary students in the humanities, including via a dedicated course within the recently established Master of Science in Digital Scholarship. Active involvement of map library staff in digital humanities teaching is not unique to Oxford, but can also be found in other universities.<sup>10</sup> Teaching at the nexus of cartography and digital scholarship is also being undertaken by staff at non-university libraries, including the staff training offered internally by the British Library.<sup>11</sup>

In part, the humanistic spatial turn can be explained by the proliferation of open source tools and datasets which have broadened access to (and awareness of) GIS-based methods. However, the broadening interest may also be fuelled by growing awareness among students of AI tools, in particular those applying Computer Vision (CV) methods to map images. Pioneering CV tools for analysing maps can appeal to researchers from disciplines in which 'traditional' GIS methods are less suitable. Unlike established GIS platforms, these new tools have been designed with more humanistic applications in mind from the outset. The Alan Turing Institute's *MapReader* pipeline, in which small squares extracted from map images (known as 'patches') are the primary unit of analysis, rather than vector features and attributes, remains the chief example of such rethinking.<sup>12</sup> These methods depend on the availability of digitised

images of maps as a starting point. In the context of using digital historical maps within literary studies, Leah Thomas also underscores the importance of providing metadata which is both comprehensive enough and suitably formatted to be useful for these innovative methods, which may go beyond the bibliographic data currently found in most library catalogues.<sup>13</sup>

While these trends are undoubtedly changing the ways in which historical maps are used by researchers, what is less certain is the extent to which they will have lasting impacts on the discipline, by facilitating entirely new types of research questions and methodologies. It remains the case that a majority of research projects use digitised historical mapping as an environmental proxy, in lieu of an otherwise inaccessible place or time. A body of work in which digital scholarship methods are applied to investigate the map itself, as a text or artefact in its own right, has yet to emerge. Advancements in digitisation technologies may offer some solutions to this, and the establishment of global standards for these technologies such as the International Image Interoperability Framework (IIIF), is strengthening this work by promoting inter-institutional collaboration as well as technical solutions. While digital viewers cannot replicate all aspects of the materiality of a physical map item, the continual improvement of 3D scanning techniques and platforms for making these data available is going some way towards closing this gap, as well as allowing the remote study of details which are imperceptible if looking at the original item. An innovative example is the work of the ARCHiOx project (University of Oxford and the Factum Foundation), which has revealed new insights into printed maps, manuscripts, and copperplates via its high-resolution 3D recording techniques (Fig. 2).<sup>14</sup>

The digital transformation of cartography brings significant positive opportunities for historical map scholarship. At the same time, it also poses threats which warrant further attention; especially regarding digital preservation, ethical issues, and the increasing impact of AI. Collaborative discussion between map historians, curators, computer scientists, academics, and others, likely holds the key to finding workable solutions which span these different areas of expertise. Making the most of innovative scholarship methods and technologies in ways that are ethical, equitable, and sustainable for the long term would be an ideal outcome.



Fig. 2. A 3D recording of an eighteenth-century manuscript map of the Middle East by John Gagnier in true colour (left) and a shaded surface render (right). The image reveals scoring on the map's surface which is not otherwise visible, providing insights into the map's creation (Map Res. 73; © Bodleian Libraries, courtesy of ARCHiOx/John Barrett).

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<https://doi.org/10.1080/03085694.2025.2567128>

#### NOTES AND REFERENCES

- Jordana Dym, ed., 'Forum: Collecting Born-Digital Maps,' *Imago Mundi* 75, no. 1 (2023): 111–29.
- Jacques Bertin, *Sémiologie graphique: Les diagrammes, les réseaux, les cartes* (Mouton/Gauthier-Villars, 1967).
- John A. Olson, 'The Digital Debacle: Is the Cart Before the Horse?,' *Journal of Map & Geography Libraries* 2, no. 2 (2006): 75–78.
- MapsGPT, 'Guide to MapsGPT,' accessed January 8, 2025, <https://www.proxi.co/blog/guide-to-mapsgpt>. Steve Attewell presented some of Ordnance Survey's experimental AI tools at the British Cartographic Society Annual Conference at University College London, 5 September 2024. The full video is available online at <https://www.youtube.com/watch?v=hYlOWMpSZvE>.
- Clifford A. Lynch and Edwin B. Brownrigg, 'Conservation, Preservation, and Digitization,' *College & Research Libraries* 47, no. 4 (1986): 379–82, 379 and 381.
- National Library of Scotland, 'Map Images,' accessed January 6, 2025, <https://maps.nls.uk/>; and David Rumsey Map Collection, accessed 6 January 2025, <https://www.davidrumsey.com/>.
- Kristina Liv Larsen, Evan Thornberry, and Valeria Vitale, 'Teaching and Learning with Text on Maps: A David Rumsey Collection Case Study,' *Imago Mundi* 76, no. 2 (2024): 290–96, <https://doi.org/10.1080/03085694.2024.2453335>.
- National Library of Australia, 'Trove,' accessed 16 December 2024, <https://trove.nla.gov.au/>.
- 'IIIF Map Collections,' GitHub, accessed 16 December 2024, <https://github.com/allmaps/iiif-map-collections/blob/main/iiif-map-collections.yml>.
- Andrzej Rutkowski and Stacy R. Williams, 'From an Archive to a Digital Map Edition: Introducing the Spatial Turn to an Undergraduate Writing Course,' *Journal of Map & Geography Libraries* 15, nos. 2–3 (2019): 221–38; and Meagan Duever and Emily McGinn, 'Teaching GIS in a Digital Humanities Environment,' *Journal of Map & Geography Libraries* 16, no. 3 (2020): 229–38.
- Adi Keinan-Schoonbaert and Gethin Rees, 'A Season of Place: Teaching Digital Mapping at the British Library,' *Journal of Map & Geography Libraries* 15, nos. 2–3 (2019): 239–62.
- Kasra Hosseini, Daniel C. S. Wilson, Kaspar Beelen, and Katherine McDonough, 'MapReader: A Computer Vision Pipeline for the Semantic Exploration of Maps at Scale,' The Alan Turing Institute, accessed 7 January 2025, <https://www.turing.ac.uk/news/publications/mapreader-computer-vision-pipeline-semantic-exploration-maps-scale>.

13. Leah Thomas, 'Cartographic and Literary Intersections: Digital Literary Cartographies, Digital Humanities, and Libraries and Archives,' *Journal of Map & Geography Libraries* 9, no. 3 (2013): 335–49.

14. John Barrett, 'ARCHiOx: Research and Development in Imaging,' *The Bodleian Conveyor*, accessed 7 January 2025, <https://blogs.bodleian.ox.ac.uk/theconveyor/archiox-research-and-development-in-imaging>.

