

Methods and Insights



A Tale of Two Collectors: Using *nodegoat* to Map the Connections Between the Manuscript Collections of Thomas Phillipps and Alfred Chester Beatty

Toby Burrows

School of Humanities, University of Western Australia

Oxford e-Research Centre, University of Oxford

toby.burrows@uwa.edu.au

Two of the most important manuscript collectors of the nineteenth and twentieth centuries were Thomas Phillipps (1792–1872) and Alfred Chester Beatty (1875–1968).¹ Phillipps's collection was remarkable for its size; he acquired more than forty thousand medieval and early modern manuscripts as well as tens of thousands of books and hundreds of art works. The dispersal of his collection after his death spanned more than a century, and his manuscripts were spread around the world into many institutional and private collections (Munby 1951–60; Burrows 2018b). Beatty's collection, on the other hand, was notable for its selectivity and connoisseurship. Though he owned no more than 190 Western medieval and early modern manuscripts, they were significant as exemplars of outstanding quality in illumination, script, and design (Cleaver 2017). At least sixty of these manuscripts came from the Phillipps collection. Since Beatty's collecting interests and priorities changed over time, only a few are still in the Chester Beatty Library in Dublin; the others were sold on to other collectors and institutions as part of Beatty's extensive sales in 1932/33 and 1968/69.

The intertwined collecting activities of these two men are important for the broader history of manuscript collections since the nineteenth century. They help us to understand what was thought to be worth collecting and how collections were formed and dispersed around the world. The histories of the Phillipps-Beatty manuscripts after they were sold by Beatty also illustrate how and why manuscripts moved between private and public collections.

¹ I am very grateful to Dr. Laura Cleaver (Trinity College Dublin), the staff of the Chester Beatty Library in Dublin, Dr. Mara Hoffman (Sotheby's, London), and Dr. William Stoneman (Harvard University Library) for their assistance and expertise in relation to Alfred Chester Beatty, and to Pim Van Bree and Geert Kessels for their help with *nodegoat*.

These provenance events are important for their contribution to the wider picture of the transmission of medieval and early modern manuscripts down to the present day. Without collectors like Phillipps and Beatty, far fewer manuscripts would have survived as witnesses to the variety of medieval and early modern history and society.

In the past, these topics have been explored with the use of lists and tables, or through provenance notes in the descriptions of individual manuscripts. While these histories sometimes have the excitement of a detective story, the results are often anecdotal and hard to aggregate into a larger picture of the history of manuscript collecting (De Ricci 1930; De Hamel 2016). In this essay, I report on a new approach for research into manuscript collections, using the *nodegoat* software developed by Lab1100 in the Netherlands. *nodegoat* is “a Web-based data management, network analysis and visualization environment” (Van Bree and Kessels 2015). It enables the histories and movements of groups of manuscripts to be tracked and visualized, providing a more holistic view of the data and offering a platform for further analysis. It combines flexibility in building data models with a low-tech approach to importing data through CSV files. Individual researchers can request free accounts through the *nodegoat*.net website, and can set up multiple projects for different datasets. *nodegoat* can also be installed locally or on sites like Amazon Web Services.

Gathering the data

The data relating to the histories of these manuscripts are scattered across various heterogeneous sources. At one extreme is the Schoenberg Database of Manuscripts, in which every record is one piece of evidence relating to the provenance or ownership history of a single manuscript. Of almost 240,000 records, 210 mention both Phillipps and Beatty. Nearly 20,000 records mention Phillipps. The data can be downloaded in the form of CSV files, either for the whole database or for the results of a specific search. CSV files can usually be loaded directly into another database or a visualization engine for analysis. The Schoenberg Database has its own data model, which focuses on the different elements of each provenance event, including seller, buyer, date, previous owners, price, and the contents of the manuscript involved (authors and works).

At the other extreme are unpublished handwritten sources relating to these manuscripts. The most interesting of these is Beatty’s notebook in which he recorded his impressions of the Phillipps collection when he went to see it at Thirlestaine House in Cheltenham in the early 1920s.² His notes included

² This notebook is now owned by the Chester Beatty Library in Dublin, Ireland.

succinct evaluations of specific manuscripts, such as “Might be worth seeing again. Doubtful” (in relation to Phillipps MS 9592), as well as estimated prices suggested to him by the owner: “F. asked £3000 at first but far too high” (Phillipps MS 3633). While digital images can be made of the notebook, data from it can only be extracted and captured by manual transcription.

The other data sources fall somewhere between these two extremes. Printed volumes can be scanned and the OCR version of the text extracted for transformation into a format like CSV. But this is heavily dependent on the nature and quality of the printed pages; Phillipps’s own printed catalog of his manuscripts (which covers little more than half of his collection) produces relatively poor results in the version scanned by Google Books (Phillipps 1837–71). Library catalog databases are another important source, usually in the MARC format, but it can be surprisingly difficult to download groups of records from them in a format suitable for reuse. Library manuscript catalogs encoded using the Text Encoding Initiative (TEI) specifications are even more difficult to reuse, since they exist as XML documents rather than database records. The recent “Library Collections as Data” program is a welcome initiative aimed at persuading libraries to re-think the way they make their digital data (including catalog data) available for reuse by researchers.³

Digital environment

The provenance histories of manuscripts are difficult to model in a computational setting, given the variety of different approaches adopted by libraries and museums (Burrows 2018a). Bringing such heterogeneous sources together in a single environment requires a unifying data model as well as suitable software for managing and combining the data. My requirements for identifying such software included:

- Flexible and adaptable data modeling.
- Ability to ingest data manually and through spreadsheets.
- Capacity to reconcile with external Linked Data vocabularies.
- Ability to produce visualizations of geographical and temporal relationships and of social networks.
- Web-based, with low data storage needs.
- Relatively easy to learn.
- Capacity for browsing and searching the data in a variety of ways.

³ Always Already Computational: Collections as Data. <https://collectionsasdata.github.io> (accessed 1 September 2019).

After ruling out wiki-style environments like Confluence, I investigated the Neo4j graph database software (Van Bruggen 2014). While it met several of my requirements (especially for data modeling and ingest), it was not web-based and had a fairly steep learning curve. Its visualization capabilities were relatively limited, and most users built a more sophisticated environment on top of Neo4j itself.

nodegoat, on the other hand, met all my requirements. Its flexible approach provides a good way of aggregating data with a customized data model, using a structure based on objects and attached sub-objects. In simple terms, “objects” represent entities and “sub-objects” represent events or changes of state affecting these entities. In the context of my data model, a “Manuscript” object can have sub-objects for transactions such as “Sold” and “Owned,” and these sub-objects can contain links to the Persons and Organizations participating in each transaction, as well as the times and places where the transaction occurred.

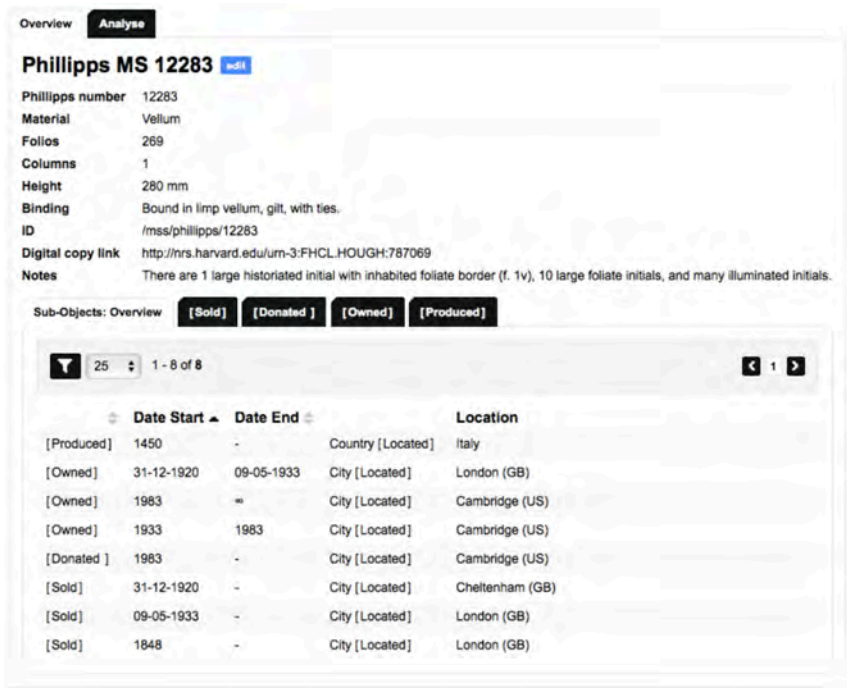


Figure 1. *nodegoat* record for Phillipps manuscript 12283.

The sub-objects attached to each manuscript record can provide a summary of the known events in its provenance history. Figure 1 shows the *nodegoat*

record for Phillipps MS 12283, one of the Italian manuscripts owned by Phillipps and later by Beatty, which is now in the Harvard University Library. The “Object” record, which contains a physical description of the manuscript, is accompanied by a series of “Sub-objects” which show different events in its history: Produced, Owned, and Sold. Three of these “Sold” sub-objects appear in Figure 2, showing the places, persons, and organizations linked into each event.

The screenshot shows the 'Phillipps MS 12283' record in the nodegoat database. The metadata section includes:

- Phillipps number: 12283
- Material: Vellum
- Folios: 269
- Columns: 1
- Height: 280 mm
- Binding: Bound in limp vellum, gilt, with ties.
- ID: /mss/phillipps/12283
- Digital copy link: <http://nrs.harvard.edu/urn-3:FHCL.HOUGH:787069>
- Notes: There are 1 large historiated initial with inhabited foliate border (f. 1v), 10 large foliate initials, and many illuminated initials.

Below the metadata, there are tabs for 'Sub-Objects: Overview', '[Sold]', '[Donated]', '[Owned]', and '[Produced]'. The 'Sold' tab is active, showing a table of sales events:

Date Start	Date End	Location	Agent	Owner	Schoenbe
31-12-1920	-	City [Located] Cheltenham (GB)		Ferwick, Thomas FitzRoy Phillipps	
09-05-1933	-	City [Located] London (GB)	Sotheby's	Beatty, A. Chester	
1848	-	City [Located] London (GB)	Payne & Foss		

Figure 2. “Sold” sub-objects for Phillipps manuscript 12283.

Within the *nodegoat* database, two different types of vocabulary can be deployed: those inherent in *nodegoat* itself and those chosen by the creator of the database. The Geonames ontology for place-names is incorporated into individual projects hosted on the *nodegoat* site. While this makes geographical visualizations of the data relatively easy, it also has the limitations associated with only recognizing contemporary countries and cities. Personal names in *nodegoat* can be matched against Wikidata and the Virtual International Authority File (VIAF). Other types of classifications can be created specifically, including those for languages, currencies, and materials.

Data can be entered manually in *nodegoat*, but it is generally more efficient to import data in bulk through CSV files. An Import Template must be created for each unique CSV format by mapping the CSV columns to objects and sub-objects. The import routine consists of loading the CSV file to *nodegoat*, choosing the appropriate Import Template, and running the import process.

Various parameters can be set for this process, such as whether to create new objects automatically as part of the data load or to hold each object for manual review against possible matches.

The major difficulties in the import process are likely to arise from mapping the source data to the *nodegoat* data model. This is especially so when multiple pieces of information are conflated into a single column in the CSV file, or into a single field in the source database. A person's dates of birth and death may be included in the same column as their name, for example, or the names of multiple previous owners may be included in a single provenance field. Alternatively, a field may be given in a narrative or note format, containing multiple pieces of information. In these cases, the source data are likely to require extensive editing with a tool like OpenRefine before they can be loaded to *nodegoat* (Verborgh and De Wilde 2013).

Identifying and recording Beatty's Phillipps manuscripts can be done by means of a spreadsheet or table (as in Appendix 1), but only up to the point where the complexity of the data relating to each manuscript becomes difficult to manage. A software environment like *nodegoat* makes it possible to record and collate a large number of data points for each manuscript, together with the interconnections between them. The *nodegoat* database used to record, identify, and analyze the Phillipps-Beatty manuscripts is actually designed for a much larger purpose: recording the Phillipps manuscripts and their histories. It is still very much work-in-progress, given the scale of the Phillipps collection and of the very large body of evidence relating to it. The pilot version of this database covers more than 1,600 former Phillipps manuscripts, and has been populated with a selection of data from the Schoenberg Database of Manuscripts, several library catalogs, the printed Phillipps catalog, and archival sources like the Beatty notebook. It can be explored at <http://personal-research-domain-burrows.nodegoat.net/>.

Exploring the data

Beatty's acquisitions of former Phillipps manuscripts were discussed by Christopher de Hamel in a *Book Collector* article in 1991, but his list of fifty-one is incomplete (De Hamel 1991). Based on a fuller range of sources, the actual number seems to have been at least sixty. A summary list of these is given in Appendix 1. My *nodegoat* database contains records for all sixty of these manuscripts, but these represent the data gathered from other sources. The database cannot currently be used to determine whether any other Phillipps manuscripts were later owned by Beatty; it would have to contain all

the records of all the histories of all the Phillipps manuscripts to make this possible. No other current manuscript database can meet this requirement, either. Sources like the Schoenberg Database of Manuscripts tell only part of the story. But the *nodegoat* database can serve as the means of collating relevant data from various sources and making them available for exploration and analysis, within the context of the broader Phillipps database.

The screenshot shows a search interface for the Nodegoat database. At the top, there is a section labeled "[Owned]". Below this, several filter categories are visible:

- Amount:** Set to "=" with a dropdown menu showing "Any".
- Date:** Set to "Range".
- Date From:** A date input field set to "d-m-y".
- Date To:** A date input field set to "d-m-y".
- Location:** Set to "Reference".
- Location Reference:** Set to "City" and "Located". Below this is a search input field with a magnifying glass icon and a "more" button.

 At the bottom of the interface, there is a list of filter categories: "Owner - person", "Owner - organization", "Location - city", "Location - country", "Notes", "Ownership number", and "Source of Data". The "Owner - person" filter is currently selected and expanded, showing a search input field with the text "Beatty, A. Chester" and a "more" button below it.

Figure 3. Records filtered for Chester Beatty as owner.

The *nodegoat* data can be searched and browsed in various ways. The records in the database can be filtered to show those which meet a specific criterion or a combination of criteria. This is the way to identify those Phillipps manuscripts in the database which have Alfred Chester Beatty recorded as an owner, as shown in Figure 3. By contrast, Figure 4 shows the filter for finding manuscripts that have been located in Cambridge, Massachusetts at some point in their history. These filters can be combined to show those manuscripts, once owned by Beatty, which also have a connection to Cambridge.

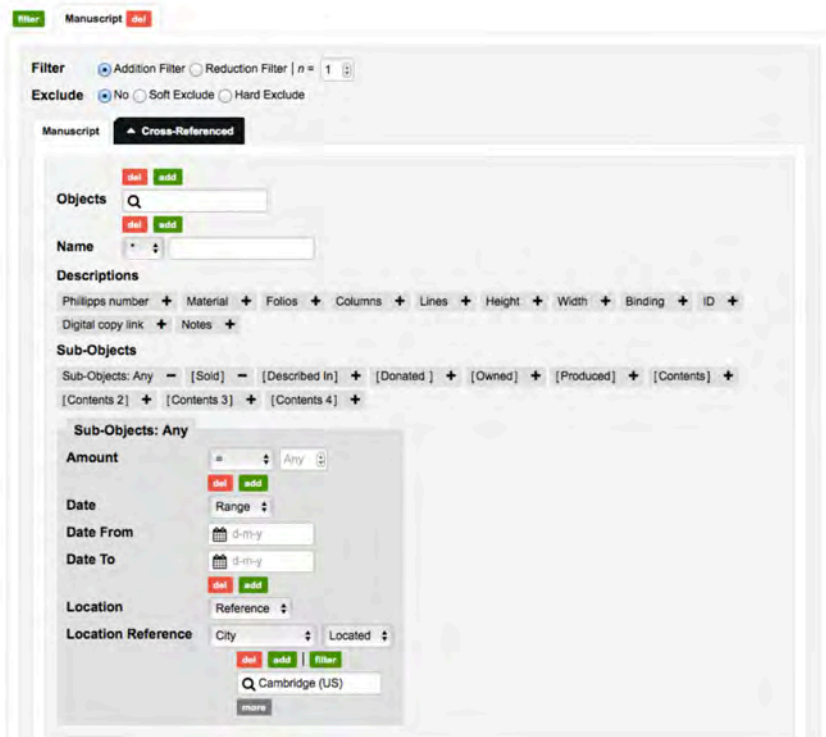


Figure 4. Records filtered for Cambridge, Massachusetts as location.

Where *nodegoat* comes into its own is with visualizations of the history and movement of these manuscripts. Figure 5 shows a geographical visualization of the history of a single manuscript (Phillipps MS 12283). This is a fifteenth-century Italian copy of the Patristic writer Lactantius, which had been acquired by Phillipps in 1848 from the booksellers Payne and Foss. It was one of a batch of twenty-seven manuscripts bought directly by Beatty from Phillipps's grandson, Thomas FitzRoy Fenwick, in December 1920. This purchase included one manuscript (Phillipps MS 14122), which was bought by Beatty's wife Edith. The total amount paid was £12,454 (including £500 for Mrs. Beatty's manuscript).

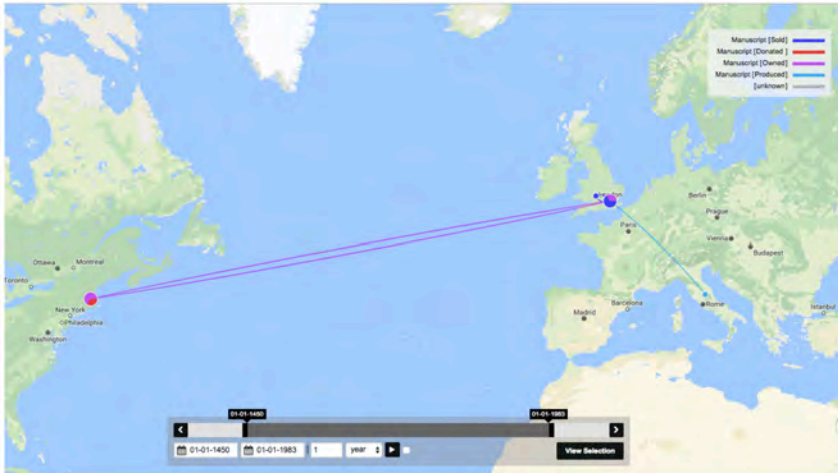


Figure 5. Geographical visualization: history of Phillipps manuscript 12283.

There were three other batches of manuscripts bought directly from Fenwick by Beatty: eight in February 1923 for a total price of £3,320, and nine in August 1924 for a further £5,105. The final batch, consisting of eight manuscripts acquired from Fenwick by Edith Beatty in November 1925 for the huge amount of £21,800, as a gift for her husband, is the most interesting. They included three of the top fifteen manuscripts listed in Beatty’s earlier notes on the “order in which Mr F places manuscripts”:⁴

- #2. Statius, *Thebaid* (Phillipps MS 1798) – bought for £7,000 (and earlier described by Beatty as “a beautiful book ... of uniformly high grade – The book is not for sale except at a high price £3000 – £5000”);
- #6. *Dictys Cretensis* (Phillipps MS 3502) – bought for £7,000 (despite Beatty’s earlier comment: “1st Visit talked about £5000”); and,
- #13. “Ferdinand, Italy XV” [i.e., the *Epistolae* of Francesco Barbaro, once in the Aragonese Royal Library] (Phillipps MS 6640) – bought for £3,000.

In total, these fifty-two manuscripts cost the Beattys £42,679. Mrs. Beatty paid far higher prices than her husband; his most expensive purchases (all in 1920) were £2,000 each for Phillipps MSS 4259 and 4769, and £1,500 for Phillipps MS 2165.

⁴ In Beatty’s notebook on Phillipps manuscripts, now owned by Sotheby’s.

Beatty also owned a further eight manuscripts which were not acquired directly from Fenwick. Three of these (Phillipps MSS 3734, 21163, and 21642) were bought from the book dealer Quaritch in late 1912, and one (Phillipps MS 2803) was bought at a Sotheby's auction in July 1921. They had originally been sold by Fenwick at Sotheby's auctions in 1896, 1898, and 1903. For three other manuscripts (Phillipps MSS 345, 629, and 3726), the method and date of acquisition remain unknown. One (Phillipps MS 345) was in Beatty's hands by 1928 at the latest, and another (Phillipps MS 3726) at some time before 1933. Beatty's final purchase was one of Phillipps's greatest treasures: the Armenian Gospel Book (Phillipps MS 15364) with which Phillipps had been photographed in 1860. It was bought in 1948 from the Robinson brothers, the London book dealers who had acquired the residue of the Phillipps collection in 1945.

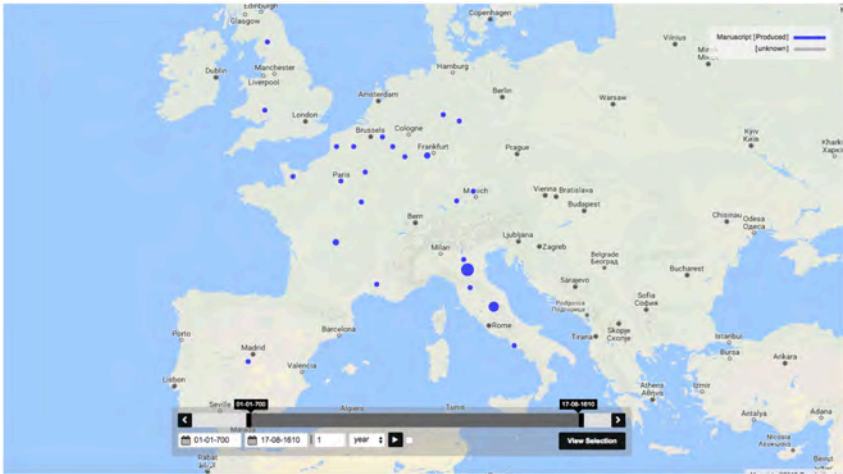


Figure 6. Geographical visualization: Phillipps-Beatty manuscripts to 1610.

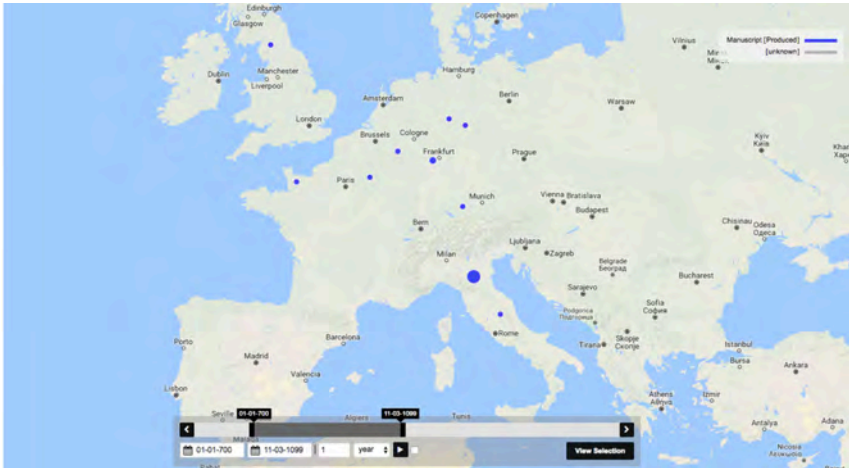


Figure 7. Geographical visualization: Phillippus-Beatty manuscripts before 1100.

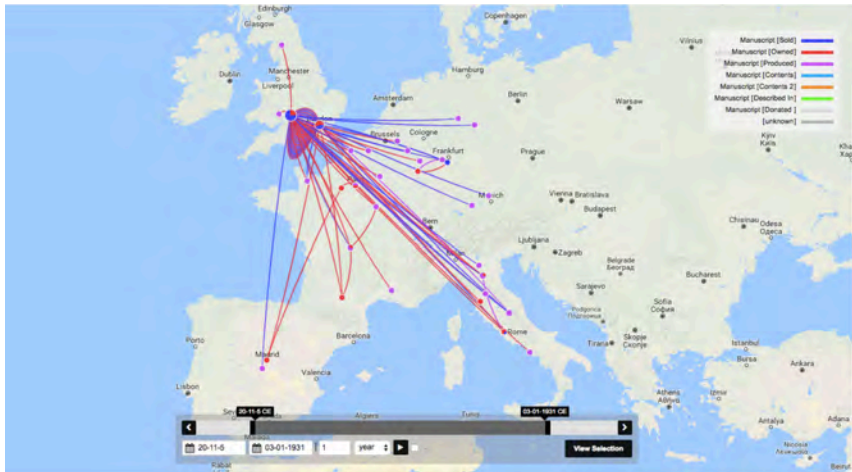


Figure 8. Geographical visualization: Phillippus-Beatty manuscripts to 1931.

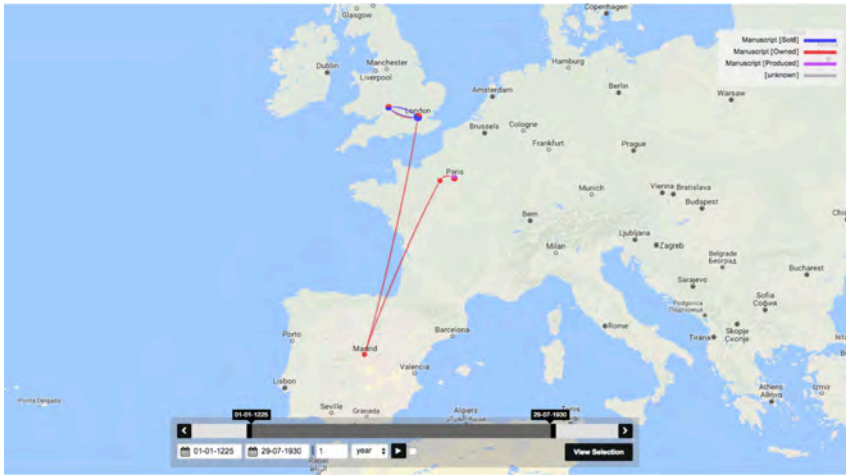


Figure 9. Geographical visualization: Phillipps manuscript 4259 to 1931.

The *nodegoat* visualizations can be extended to show the data relating to the provenance of all sixty manuscripts. Figure 6 shows their places of production, where this can be localized. They came from all over Western Europe, but mainly from Italy, Germany, and France, with only a few from Britain and Spain. The time-slider at the bottom of the map can be used to refine this information further. Figure 7 shows the places of production for those manuscripts originating from before 1100; the geographical distribution is generally similar to that of the later manuscripts. Figure 8 shows the histories of the Phillipps-Beatty manuscripts up to 1931, after Beatty had acquired almost all of them but before the first of his major sales in 1932. Most of the movement is towards England, reflecting the nineteenth-century purchases by Phillipps and the twentieth-century sales by Fenwick to Beatty. There are a small number of other movements around Europe, but for most manuscripts their history before Phillipps acquired them is largely unrecorded. An exception is Phillipps MS 4259, the so-called Duprat Bible; produced in the earlier thirteenth century, it had successive owners in France and Spain before travelling to England in the nineteenth century, as shown in Figure 9 (Kidd 2015).

Beatty was not the kind of collector who kept everything he acquired. He preferred a continual reappraisal of his collections, partly for financial reasons, partly because he was keen to improve their overall quality, and partly because his tastes and interests changed over time (Horton 2000). Relatively few of his Western manuscripts remain in the Chester Beatty Library today. It was in this context that he eventually disposed of most of his Phillipps

manuscripts. Twenty-four of them were offered for sale at Sotheby's as part of his two great auctions of 1932 and 1933. Ten were offered in the 1932 sale; two of these failed to sell. A further fourteen were offered and sold in the 1933 auction. Three other manuscripts were exchanged with, or sold to, the collector A. S. Yahuda in the 1920s and 1930s (Phillipps MSS 345, 385, and 437). Edith Beatty sold at least two manuscripts in 1952, to the Morgan Library and the Walters Art Museum (Phillipps MSS 2165 and 14122). The time and method of disposal of three other manuscripts remain unknown (Phillipps MSS 629, 3734, and 21642).

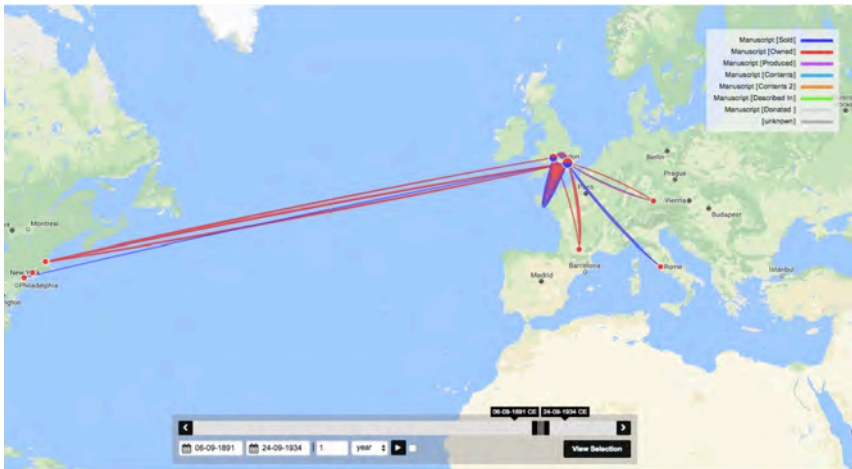


Figure 10. Geographical visualization: Phillipps-Beatty sales to 1933.

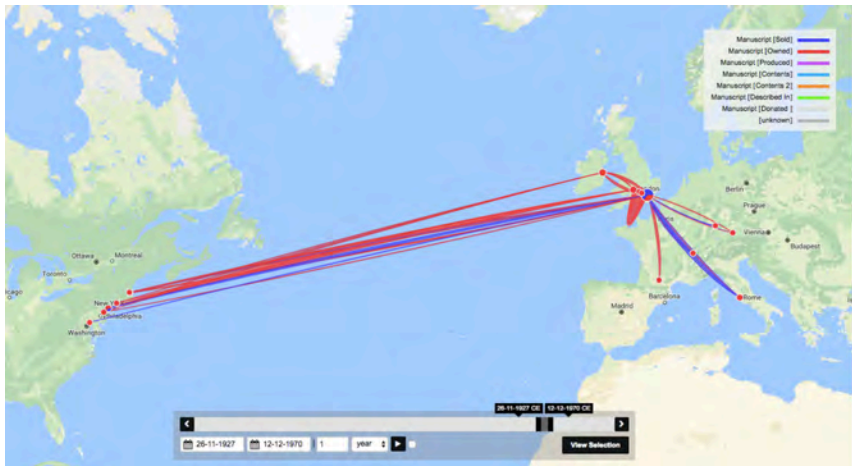


Figure 11. Geographical visualization: Phillipps-Beatty sales to 1969.

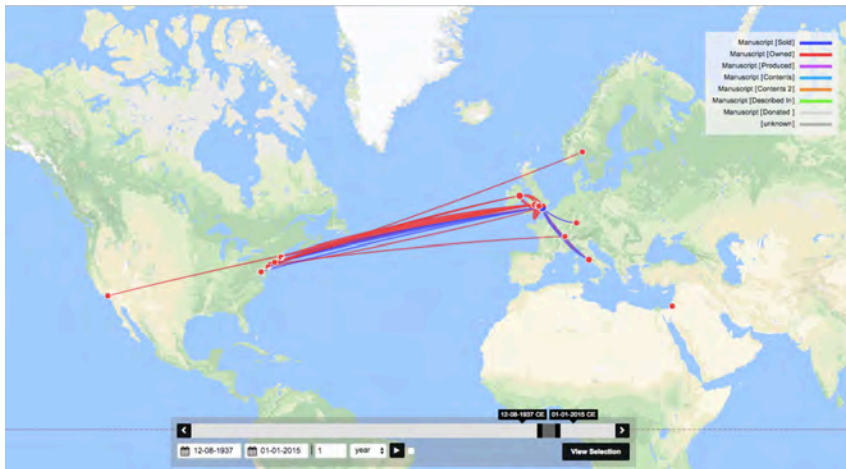


Figure 12. Geographical visualization: Phillipps-Betty current locations.

In the initial sales of 1932–33, most of the buyers were European or English, as shown in Figure 10. Only three manuscripts are shown as traveling to the United States. In fact, these sales were regarded as a relative failure, with the Great Depression blamed for the poor market conditions (Clever and Magnusson 2018). After the sales in 1968 and 1969, as well as in earlier years, the picture was rather different, as seen as Figure 11; the migration of manuscripts to North America substantially increased. Since then, they have spread even farther around the world, as Figure 12 shows. The current locations of forty-seven of these manuscripts are known. There are eighteen in public institutional collections in the United States, six in Italy, six in the United Kingdom, two in Switzerland, and one each in Germany and Israel. The known owners of these manuscripts are the Biblioteca nazionale centrale di Roma (six), the British Library (four), Harvard University (four), the Morgan Library (four), the Walters Art Museum (three), the Bodmer Library in Geneva (two), the New York Public Library (two), Yale University (two), the Getty Museum in Los Angeles (one), the Boston Public Library (one), Lincoln College Oxford (one), the National Library of Israel (one), Princeton University (one), the Sir Paul Getty Library at Wormsley in the United Kingdom (one), and the Landesbibliothek in Stuttgart (one).

Today, thirteen former Phillipps manuscripts are still in the Chester Beatty Library in Dublin. Twelve of these appear on a list of Western manuscripts exhibited at the Chester Beatty Library in November 1967. These were the same manuscripts that remained in the library after Beatty's death, in accordance with his will—as set out in the typewritten list certified by his librarian

Richard James Hayes, dated 22 April 1968.⁵ The other is the Armenian Gospels bought in 1948. One of the two manuscripts left unsold at the 1932 sale is still in the Chester Beatty Library today (Phillipps MS 132). Of these manuscripts, six had been bought from Fenwick in 1920, six from Fenwick in 1925 by Edith Beatty, and one from the Robinson brothers in 1948 (the Armenian Gospels). This is a substantial reduction from the thirty- to thirty-four Phillipps manuscripts which must have been in the Chester Beatty Library when it first opened to the public in Dublin in 1953. Seventeen of these were then offered for sale in the two Sotheby's auctions held after Beatty's death—eight in the 1968 sale, and nine in the 1969 sale. The latter group included one of the manuscripts left unsold thirty-seven years earlier (Phillipps MS 10190).

The current location of fourteen of the manuscripts remains unknown. They include one (Phillipps MS 2251) which is known to have been exported to France for a private owner after its sale in 1975. Another manuscript (Phillipps MS 2506) was broken up after it was sold in 1969. At least sixteen individual leaves from it have passed through the sale rooms in the last forty-five years, including three which were bought back by the Chester Beatty Library and two which are now in the University of Melbourne, Australia.

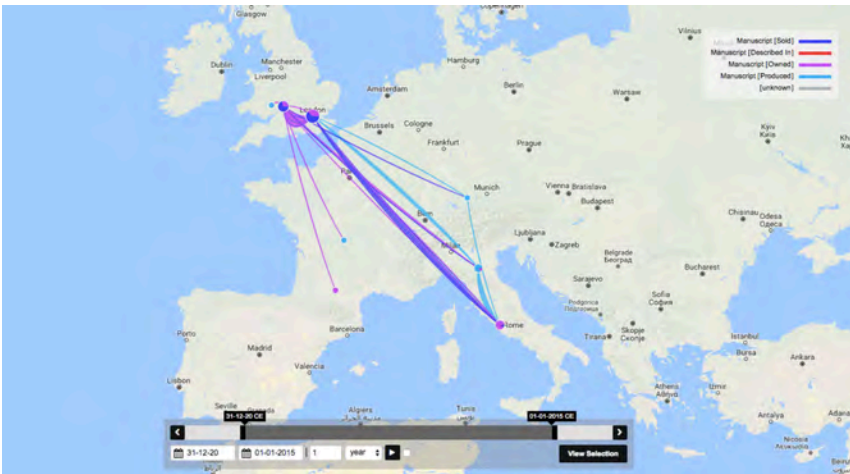


Figure 13. Geographical visualization: British Library and Biblioteca nazionale centrale di Roma.

If the first group of research questions around the Phillipps-Beatty manuscripts relates to their histories, their sales, and their current locations, the second relates to their various owners. The map-based visualizations may

⁵ Copy in Bodleian Library, R.Pal.6.6a

reveal some features of the institutional owners. Figure 13 shows the histories of the ten manuscripts now owned by either the British Library or the Biblioteca nazionale centrale di Roma. All but one of the latter's holdings are of manuscripts originating from Nonantola Abbey in Northern Italy—probably a sufficient explanation for their acquisition by that library. But only one of the British Library's four manuscripts has a British origin (Phillipps MS 12200), so the reasons for their acquisition have to be sought in factors other than their geographical histories.



Figure 14. Network graph: Phillipps-Betty manuscripts.



Figure 15. Network graph: Phillipps-Betty manuscripts since 1934.

More applicable to the analysis of ownership is the other kind of visualization in *nodegoat*, which takes the form of a “social visualization” or network graph, showing the connections between manuscripts, persons, and organizations. The network graph for the Phillipps-Beatty manuscripts is shown in Figure 14. Unsurprisingly, the predominant entities are Beatty (who owned all these manuscripts), Fenwick (who sold most of them), and Sotheby’s (where many of the later sales took place). A time-slider can be used here too, with Figure 15 showing the network graph for these manuscripts since 1934. The social networks of individual owners of manuscripts can also be visualized; Figure 16 shows the network graph for the Biblioteca nazionale centrale di Roma.

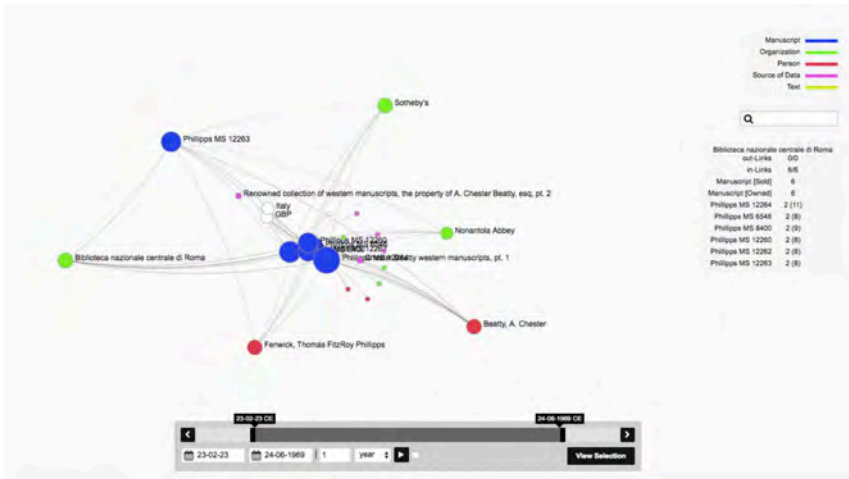


Figure 16. Network graph: Biblioteca nazionale centrale di Roma.

In its current state, however, the database does not contain enough contextual data about persons and organizations to make quantitative network analysis feasible. The evidence shows, for example, that a number of other well-known private collectors owned at least one of these manuscripts at some stage after they were sold by Beatty. Their names are a roll-call of many important European and American collectors of the twentieth century: St. John Hornby, Major J. R. Abbey, Philip Hofer, Eric Millar, William Scheide, Martin Schøyen, Peter Ludwig, A. S. Yahuda, and André De Coppet. In all cases, these collectors either donated their manuscripts to a public institution or sold them at auction, sometimes posthumously as part of their estate. The involvement of this group of collectors reflects the value and significance of the manuscripts themselves, as well as the taste and judgment of Beatty and Phillipps. But without much fuller data about the social networks of these

people, and about their entire manuscript collections, quantitative analysis of their networks is not realistic. Data can always be exported from *nodegoat* as CSV files or as JSON objects via an API for possible reuse and analysis in another software environment. In any case, because the *nodegoat* database produces a complex, multimodal graph with both directed and undirected edges, the reservations about applying analytical measures expressed by an expert like Scott Weingart are very relevant (Weingart 2011).

Conclusion

The data relating to the individual histories of cultural objects like medieval and Renaissance manuscripts can be complex and difficult to manage. *nodegoat* is particularly suitable as a digital environment for this purpose. It can gather and store large quantities of data in a flexible but consistent format, and present it for exploration by the researcher. As well as answering straightforward quantitative research questions (such as, how many manuscripts did Phillipps and Beatty both own?), it can also provide answers to questions involving more complex combinations of criteria: which manuscripts originated in Italy, were owned by both Phillipps and Beatty, and are now located in Italy again? The geographical and network visualizations built into *nodegoat* are a particularly helpful way of enabling researchers to conceptualize a whole body of interrelated data, and provide a valuable diagnostic tool for exploring relationships and linkages within an entire dataset.

These visualizations are not, in themselves, explanations of the data, and the relationships they reveal between entities and events are not necessarily causal ones. As Johanna Drucker reminds us, visualizations tend to gloss over uncertainties, ambiguities, and gaps in the evidence—and almost inevitably simplify the picture (Drucker 2014). Nevertheless, they are very helpful summaries of a complex body of data, which may serve as useful indicators and diagnostic tools for thinking about the dataset in a holistic way. In the context of manuscript histories, these visualizations can point out factors and connections which may be significant: trends in geographical movement over time (to the United States, in the case of the Phillipps-Beatty manuscripts); the distribution of places of origin of the manuscripts; the extent and nature of connections between particular collectors or groups of collectors.

nodegoat has in-built strategies for coping with uncertainty and ambiguity, and with variations in terminology over time, though the geographical visualizations work best when specific places and years can be associated with specific events. Regions can be used, as long as they are associated with a

geographical polygon. The data model is flexible enough to incorporate indicators for levels of certainty and uncertainty, and these can be used to filter the display of information in the visualizations. Nevertheless, these images cannot be taken as aggregations of *all* the data in the dataset; rather, they are aggregations only of those data which are sufficiently precise and specific to be mapped or linked.

As well as recording, analyzing, and displaying complex data relating to the histories of the Phillipps-Beatty manuscripts, *nodegoat* can also help to put these manuscripts into a broader context. Adding data relating to the wider activities of these two collectors, and to their relationships with other people and institutions in the manuscript trade in the nineteenth and twentieth centuries, is readily done. This expansion of the networks of relationships can be visualized at an increasing density and scale. In this way, *nodegoat* can serve as the digital environment not just for a specific investigation, but for a broader set of research questions across an expanding dataset.

Appendix 1: The Phillipp-Beatty manuscripts – a summary list

Phillipps MS no.	Beatty no.	Current location	Other owners
125	W.M.S.66	Chester Beatty Library	
134 / 3948	W.M.S.80	Chester Beatty Library	
137	W.M.S.110	Getty Museum	Marston, Ludwig
240	W.M.S.125	Unknown	
250	W.M.S.99	Chester Beatty Library	
345		Yale University	Yahuda
385	W.M.S.33	British Library	Yahuda
389	W.M.S.13	Bodmer Collection	
390	W.M.S.14	Princeton University	Scheide
437		National Library of Israel	Yahuda
447	W.M.S.57	Unknown	
629	W.M.S.179	Unknown	Abbey
934 / 2708	W.M.S.18	Unknown	Abbey
1036	W.M.S.46	Walters Art Museum	
1092	W.M.S.31	Harvard University	
1798	W.M.S.76	Chester Beatty Library	
2165 / 21787	W.M.S.9	Morgan Library	
2251	W.M.S.102	Unknown	Hornby, Abbey
2506	W.M.S.173	<i>Broken up by 1975</i>	
2803	W.M.S.123	Unknown	
3009	W.M.S.120	Unknown	
3010	W.M.S.112	New York Public Library	
3075	W.M.S.15	Unknown	Schøyen, Bodmer
3339	W.M.S.67	Unknown	Hornby, Abbey
3344	W.M.S.29	Chester Beatty Library	
3383	W.M.S.65	Unknown	
3502	W.M.S.122	Chester Beatty Library	
3535	W.M.S.23	Morgan Library	Millar
3674	W.M.S.16	British Library	
3726	W.M.S.35	Harvard University	
3734	W.M.S.36	Walters Art Museum	

Phillipps MS no.	Beatty no.	Current location	Other owners
3897	W.M.S.70	Sir Paul Getty Library	
4259	W.M.S.54	Boston Public Library	
4448	W.M.S.58	Lincoln College Oxford	
4597	W.M.S.32	Stuttgart Landesbibliothek	
4600	W.M.S.68	Harvard	Hofer
4769	W.M.S.22	Chester Beatty Library	
6546	W.M.S.12	Biblioteca nazionale centrale di Roma	
6640	W.M.S.113	Chester Beatty Library	
6659	W.M.S.110	Bodmer Collection	
6972	W.M.S.114	New York Public Library	
7084	W.M.S.108	Chester Beatty Library	
8400	W.M.S.2	Biblioteca nazionale centrale di Roma	
10190	W.M.S.11	Yale University	
12200	W.M.S.59	British Library	
12260	W.M.S.4	Biblioteca nazionale centrale di Roma	
12261	W.M.S.3	British Library	Wilfrid Merton
12262	W.M.S.7	Biblioteca nazionale centrale di Roma	
12263	W.M.S.6	Biblioteca nazionale centrale di Roma	
12264	W.M.S.5	Biblioteca nazionale centrale di Roma	
12269	W.M.S.43	Chester Beatty Library	
12283	W.M.S.104	Harvard University	
12348	W.M.S.17	Chester Beatty Library	
14122	W.M.S.10	Walters Art Museum	
	Armenian Ms		
15364	558	Chester Beatty Library	
17364	W.M.S.167	Chester Beatty Library	
21163	W.M.S.105	Unknown	

Phillipps MS no.	Beatty no.	Current location	Other owners
21642	W.M.S.191	Unknown	De Coppet
21948	W.M.S.24	Morgan Library	Hornby, Abbey
36275	W.M.S.1	Morgan Library	

WORKS CITED

- Burrows, Toby. 2018a. "Digital Representations of the Provenance of Medieval Manuscripts." In *Meeting the Medieval in a Digital World*, edited by Matthew Evan Davis, Tamsyn Mahoney-Steel, and Ece Turnator, 203–22. Leeds: Arc Humanities Press.
- . 2018b. "'There never was such a collector since the world began': A New Look at Sir Thomas Phillipps." In *Collecting the Past*, edited by Toby Burrows and Cynthia Johnston, 45–62. London: Routledge.
- Cleaver, Laura. 2017. "The Western Manuscript Collection of Alfred Chester Beatty (ca. 1915–1930)." *Manuscript Studies: A Journal of the Schoenberg Institute for Manuscript Studies* 2.2: 445–82.
- Cleaver, Laura, and Danielle Magnusson. 2018. "American Collectors and the Trade in Medieval Illuminated Manuscripts in London, 1919–1939: J. P. Morgan Junior, A. Chester Beatty and Bernard Quaritch Ltd." In *Collecting the Past*, edited by Toby Burrows and Cynthia Johnston, 63–78. London: Routledge.
- Collections as Data Initiative. 2016–18. *Always Already Computational: Collections as Data*. Accessed 31 October 2018. <https://collectionsasdata.github.io>.
- Drucker, Joanna. 2014. *Graphesis: Visual Forms of Knowledge Production*. Cambridge, MA: Harvard University Press.
- De Hamel, Christopher. 1991. "Chester Beatty and the Phillipps Manuscripts." *Book Collector* 40: 358–70.
- . 2016. *Meetings with Remarkable Manuscripts*. London: Allen Lane.
- De Ricci, Seymour. 1930. *English Collectors of Books and Manuscripts (1530–1930) and Their Marks of Ownership*. Cambridge: Cambridge University Press.

- Horton, Charles. 2000. "‘It was all a great adventure’: Sir Alfred Chester Beatty and the formation of his Library." *History Ireland* 8: 37–42.
- Kidd, Peter. 2015. "The Duprat Bible [Part 1]" *Medieval Manuscripts Provenance*. Blog, 1 August 2015. Accessed 31 October 2018. <http://mssprovenance.blogspot.co.uk/2015/08/the-duprat-bible-part-i.html>.
- Munby, Alan Noel Latimer. 1951–1960. *Phillipps Studies*, 5 vols. Cambridge: Cambridge University Press.
- Phillipps, Thomas. 1837–1871. *Catalogus librorum manuscriptorum in bibliotheca D. Thomæ Phillipps, Bart.* Middle Hill and Cheltenham: Middle Hill Press. Accessed 31 October 2018. <https://archive.org/details/CatalogusLibrorumManuscriptorum1837>.
- Van Bree, Pim, and Geert Kessels. 2015. "Mapping Memory Landscapes in *nodegoat*." In *Social Informatics*, edited by L. M. Aiello and D. McFarland, 274–78. Lecture Notes in Computer Science 8852. Berlin: Springer International Publishing.
- Van Bruggen, Rik. 2014. *Learning Neo4j*. Birmingham, UK: Packt Publishing.
- Verborgh, Ruben, and Max De Wilde. 2013. *Using OpenRefine*. Birmingham, UK: Packt Publishing.
- Weingart, Scott. 2011. "Demystifying networks, Parts I & II." *Journal of Digital Humanities* 1.1. Accessed 31 October 2018. <http://journalofdigitalhumanities.org/1-1/demystifying-networks-by-scott-weingart/>.

