Early Estonian Printings Database and the Book Damage Atlas

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ABSTRACT

This article provides an overview of the Early Estonian Printings (EEP) Database and the Book Damage Atlas created within the framework of the *Watermarks and Paper in Early Modern Estonia* project and of questions that arose in the course of the project. The aim of the project was to consider publications as a whole and to try to combine descriptions of different parts of books into a tool for researchers that is readily available and easy to use. The compilers of the EEP database have relied on the standard worked out by the International Association of Paper Historians (IPH) in their descriptions of paper and watermarks and have also added free-form descriptions of watermarks to the database. Entries in the database are tied in with databases of the European-wide Bernstein watermarks portal *The Memory of Paper*.

Keywords: paper, watermarks, database, book history, preservation

Every medium bearing text consists of several components that sometimes are separated temporally and in their geographic origin, books are a prime example of this. The text in a book may be printed or written on paper that has been long since procured and imported. Print types, printing ink or writing ink can similarly be imported from elsewhere. Finally, the work under consideration can be bound together with other texts that have been printed at different times, or it can be bound years after the printed sheets have been printed. Even though the different stages of the process of completing a book can extend over quite a long period of time, these kinds of editions should always be treated as a whole. The relationships between the parts of such a book are expressive and provide an idea of the history of the copy.[1] These kinds of observations apply not only to decidedly unique

[1] E-books are not considered here since the question of the "copy" of an e-book is somewhat more complicated. Even so, the nonrecurring individuality of the copy does

volumes (manuscripts, sammelbände and other such items). Even in the nineteenth century, it was already noticed that there is no uniformity as such in any particular print-run of any book; rather, different copies of the same book differ from each other, sometimes less and sometimes to a considerable degree. Thus the introduction of the "Catalogue of Printed Books in the British Museum"[2] printed in 1841 advises in the so called Ninety One Rules for describing a book (rule no. XIX) that "any striking imperfection in a book [has] to be carefully noted; and any remarkable peculiarity, such as that of containing cancelled or duplicate leaves, etc. to be stated." Similarly, all remarkable attributes of old books should be registered, like marginalia and ownership marks, and variations within one edition should be recorded in the bibliography.[3] Even though the topic here is primarily rare books, the generalisation made on the basis of this kind of bibliographic guideline applies in a certain sense to all books because every copy has its own history – even the mass-produced paperbacks of today. Individual differences between copies emerge in the traces of their use, distinct features arising from the conditions in which they are preserved, and other such factors. In short – the circumstance that texts and their components have come together in just that particular way is valuable information. The current shape of a book is the product of the decisions of its makers and users (conscious or subconscious). Thus it tells us about the intellectual, economic, social and technical situation of the time when it was made and used. Naturally, it is not possible and often unnecessary to consider all those components in equal measure, yet in order to provide an exhaustive overview of a copy, it is necessary to be aware of them all to a greater or lesser extent. Achieving balance between historical, analytical and descriptive bibliography is no trivial task and many bibliographers and book historians have called attention to the corresponding difficulties.[4] In acknowledgement of this, the ETF project "Watermarks and

not disappear in the case of electronic publications either – it must be borne in mind that every e-book is presented in accordance with the technical possibilities of the particular e-book reader and the user can also adjust the size, print type, and other attributes of the book's text according to his own preferences, thus creating a unique copy himself on the spot which is not, however, permanent in time.

[2] *Catalogue of printed books in the British Museum* (British Museum Dept. of Printed Books, order of the Trustees, 1841).

[3] For instance on pg. 7 of the *Catalogue,* concerning the 1616 edition of the letters of Abelard and Heloise.

[4] See for instance Fredson Bowers, "Bibliography, pure bibliography, and literary studies," *The book history reader*, ed. by David Finkelstein and Alistair McCleery (London; New York: Routledge, 2002), 27–34 [first published in *Bibliographical Society of America*,

paper in early modern Estonia" set providing the opportunity for different ways of description as its objective, thus striving to render prominent copies of early modern books associated with Estonia in the wealth of detail achieved through different ways of description. In other words, the principle of appreciating a copy as a whole should not become a hindrance to studying its details (for instance, the art historical or iconographic description of watermarks, and other such approaches) and statistical analysis that disregards the individual attributes. At the same time, it is important to be able to add new data to the database according to how technological means permit or what researchers are currently interested in.

For this purpose, the project developed a web-based application on 5D Basement platform,[5] based on open source software (PHP and MySQL).[6]

In addition to the public user environment at http://paber.ut.ee, a special administrative backend was programmed. The environment is shared by Early Estonian Printings[7] and The Book Damage Atlas.[8] The Atlas functions alongside the Printings Database as a supplementary possibility for analysis, oriented primarily to assessing damages found in old books yet allowing the evaluation of a book's condition regardless of its age. Since the aim of the project was to arrive at an idea of the book as a whole and the connections between its parts, the book's current condition plays a role in this, combining the results of the decisions made in making the book as well as decisions made in preserving it, an important part of which is the damages to the book. An accurate description of the physical condition and damage of books is also crucial for developing appropriate proactive maintenance and conservation strategies.

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47 (1952), 186–208]; D. F. McKenzie, "Printers of the mind: some notes on bibliographical theories and printing-house practices," *Studies in Bibliography,* 22 (1969), 1–76; Mark Bland, *A guide to early printed books and manuscripts* (Wiley-Blackwell, 2010), 4ff, etc.

[5] 5D Basement – multifunctional development platform for creating web-based applications, developed by 5D Vision, Estonia. See <http://www.5dvision.ee/files/5D_Vision_Software_Development.pdf> [accessed 20 February 2014].

[6] Using open source software makes it possible to avoid licensing fees and concentrate on developing the application.

[7] *Early Estonian Printings* [henceforth EEP], <http://paber.ut.ee/EN/vesimargid/> [accessed 20 February 2014].

[8] *The Book Damage Atlas*, <http://paber.ut.ee/EN/raamatukahjustused/> [accessed 20 February 2014].

The Book Damage Atlas

It is known that the creation of systems for describing the condition of books began in Estonia in the early 1980's at the University of Tartu. Methodology for describing damages was worked out and the stock of older books was examined (about 350,000 books in total).[9] The condition of the volumes of the Gustav Bergmann Memorial Collection in the University of Tartu Department of Manuscripts and Rare Books was also examined later.[10] The Estonian National Archives have dealt with working out systems for describing the condition of archival records and geographical maps.[11]

Studies of the condition of collections based on international methodologies began in 1992–1993 at the University of Tartu Library and the Estonian National Library. The so called Stanford Test worked out by Stanford University was adopted as the basis for testing. The test is based on the results of visual examination of archival records and the determination of the paper's pH and brittleness using the corner fold test.[12] The condition of the collection of geographical maps at the University of Tartu Library has also been studied, for which a corresponding methodology was worked out.[13]

The first subproject for ascertaining the most damaged collections entitled "The Condition of Cultural Objects in Estonia's Largest Libraries" of the THULE joint project to ensure the preservation of book assets in academic libraries was started up in Estonia in December of 1998. The four primary libraries involved in preserving Estonia's book heritage participated in the project – the Estonian National Library, the University of Tartu Library, the Tallinn Academy of Sciences Library (currently the University of Tallinn Academic Library) and the Estonian Museum of Literature Archival Library. A system for describing books and evaluating damages was worked out within the framework of the project. The damage atlas considered here is based on that methodology. The Archival Materials

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[9]   N. Mody, "Fondide kahjustuste väljaselgitamise ning konserveerimis- ja restaureerimistööde mahu kindlaksmääramise metoodikast," *Raamat-aeg-restaureerimine*, 5 (Tartu, 1984), 56–63.

[10]   J. Lott, "Gustav Bergmanni memoriaalkogu köited ja nende kahjustused," *Raamat-aeg-restaureerimine*, 6 (Tartu, 1990), 78–103.

[11]   *Kaartide seisundiuuringu (KaSu) metoodika väljatöötamine, uuringu teostamine ja tulemused Ajalooarhiivis*, <http://www.eha.ee/arhiivist/KaSu2.pdf> [accessed 13 February 2014].

[12]   Kurmo Konsa, "Säilikute seisund Tartu Ülikooli Raamatukogus," *Tartu Ülikooli Raamatukogu aastaraamat 1997* (Tartu: Tartu Ülikool, 1998), 133–161.

[13]   Tiina Tensing, Kurmo Konsa, "Geograafiliste kaartide füüsilise seisundi hindamine Tartu Ülikooli Raamatukogus," *Raamat-aeg-restaureerimine*, 8 (Tartu, 1997), 108–118.

Damage Atlas was published in 2013 at the Estonian National Archives in cooperation with the Latvian National Archives.[14] It catalogues 46 types of damage, describes their visual attributes and determines the degree of severity and possible causes in the case of each type of damage. The atlas is amply illustrated with photographs.

The Book Damage Atlas is a classification system of book damages using damage types and categories. Most damage determination protocols[15] are characterised by relatively high subjectivity and their unsystematic nature. Evidently, very varied terminology has been used to describe deterioration. In most cases there is no specific definition given to terms of damage description. Therefore, describing deterioration is highly subjective. It often happens that some damage descriptions are categorised according to the parts of the book (textblock damage, binding damage) where the corresponding damage is found, and others are categorised by origin of damage (environmental damage, patron mutilation). The damage

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[14]   *Atlas of damage descriptions of archival materials = Arhiivimaterjalide kahjustuste atlas = Arhīva dokumentu bojājumu katalogs* [comp. by Ruth Tiidor *et al.*] [Tartu: Rahvusarhiiv, 2013] (Jelgava: Jelgavas tipogrāfija).

[15]   Descriptions of damages are provided but not systematically: Brian J. Baird, *Library collection assessment through statistical sampling* (Lanham, Maryland, Toronto, Oxford: The Scarecrow Press, 2004), 20–64; Damages are not described or descriptions refer to only certain types of damage (ordinarily in reference to fragile paper): Jennifer Hain Teper, Sarah M. Erekson, "The condition of our "hidden" rare book collections: a conservation survey at the Univeristy of Illinois at Urbana Champaign," *Library Resources and Technical Services*, 50:3 (2006), 200–213 (213); Mary Ellen Starmer, Sara Hyder McGough, Aimée Leverette, "Rare condition: preservation assessment for rare book collections," *RBM: A Journal of Rare Books, Manuscripts, and Cultural Heritage*, 6:2 (2005), 91–106 (105–106); Jonathan Lill, *Columbia University Libraries survey of Special Collections Materials Project: survey ratings descriptions* (2004); Paul R. Green, "A method for undertaking a full conservation audit of special collections of books and manuscripts," *Collection Management*, 28:4 (2004), 23–42 (25–27); Helmut Bansa, "Beschreibung des materiellen Zustandes von Bibliotheksgut," *Bibliothek*, 29:2 (2005), 160–170 (165–167); Tori R. Gregory, "Stacking up: a how-to guide to condition surveys," *Collection Management*, 31:3 (2006), 85–100 (89–90); Bradley L. Schaffner, "Evaluating the condition of Slavic collections: simple steps to identify if a collection is at risk," *Slavic and East European Information Resources*, 3:2 (2002), 157–167 (166–167); Robert A. Mead, Brian J. Baird, "Preservation concerns for law libraries: results from the condition survey of the University of Kansas Law Library Collection," *Law Library Journal*, 95:1 (2003), 69–86 (74–79); Thomas H. Teper, Stephanie S. Atkins, "Building preservation: the University of Illinois at Urbana-Champaign's stacks assessment," *College and Research Libraries*, 64:3 (2003), 211–227 (219–222). If a general assessment of a book is given, it is not directly connected to the damages described, rather it is given as a separate assessment independent of them, see for instance Baird, *Library collection assessment*, 85–87; Gregory, "Stacking up," 89–90; Green, "A method for undertaking," 25; Lill, *Columbia University Libararies survey*; Teper, Erekson, "The condition," 213.

description in existing protocols is often very complex, including different types of damage with the evaluation given to them; this in turn makes it difficult to describe the damage and analyse it later, whereas the results will be confusing. Damage description is also often mixed up with processing evaluation. Evaluation of necessary processing should in our opinion nevertheless proceed from damage. Factors that also need to be considered are the goals of each specific organisation, existence of processing tools and know-how. Therefore, evaluation of necessary processing work should not coincide with damage description.

The current Internet-based Book Damage Atlas is a formalised system for the comparative description of book damage and for determining book condition and the extent of damage. Two classification criteria were considered. The first refers to the part of the book where the damage occurs. As books are made up of distinct parts with characteristic types of damage, the location of damage is also divided into four parts:
- textblock;
- leaf attachment;
- binding;
- biological damage (whole book).

The second criterion is related to the phenomenology of damages. Damage is described on the macroscopic level and in a phenomenological manner, as most of the damage which affects the durability of book materials and structures is clearly detectable by simple visual inspection. Physical damage that can occur in different book parts is divided into damage types (Table 1).

Table 1. Damage types in the Book Damage Atlas[16]

Damage location	Damage description
Textbock	Tears in pages Missing parts of pages Damaged edges of pages Staining and soiling of pages Discolouration of pages Textblock deformation Foxing Oil separation from printing ink Earlier repairs of textblock Paper pH Corner fold test

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[16] Kurmo Konsa, Anu Lepp, Tiiu Reimo, "Books as physical objects: Damage Atlas and Condition Calculator," *The International Journal of Books*, 9 (2012), 111–121 (116).

Leaf attachment	Loose pages Condition of the leaf attachment Corrosion of the metal staples
Binding	Retention of the book covers and assessments of the condition of cover material Condition of the hinges Condition of the corners and edges Spine of the book Covering material of the book Clasps of the book Insect damages Damaged headband Earlier repairs of binding
Biological damage (whole book)	Mould damages Insect damages

Damage types are distinct groups of damage that can easily be distinguished on the basis of features that are either morphological (shape, size, location and colour) or measurable by instruments (pH). Damage types are the basic recognisable and irreducible units of damage. Determining damage types does not generally require the identification of emergence mechanisms and causes of damage. This is a significant advantage of the given descriptive system, as the identification of damage processes is often impossible or might require more complex methods of study; damage that appears similar might be caused by different damage processes. Each of the 24 damage types in the Atlas is unambiguously separated from the other damage types. Abbreviated definitions of each damage type and its corresponding image are included.

Damages can be of different severity. It is of utmost importance to determine the extent of damage, as this is the basis for object condition estimation; also, possible actions to be taken to preserve the object are based on it. To evaluate, describe and compare relative damage levels among different books, it is useful to have a defined set of categories that describes the severity of damage. While damage types allow for precise descriptions of phenomena, damage categories have been established for the subsequent rating of individual damage.

All damage types are related to damage categories. Damage categories are presented in two manners. Some damages are described via four categories. This means that different degrees of damage severity are distinguished. Four categories are distinguished for such damages:

    1) not damaged;

2) partly damaged;
3) damaged;
4) severely damaged.

For some types of damage, two categories are distinguished: not damaged/damaged.

With respect to preservation, damage categories are very suitable indicators of the need for and urgency of intervention. The aim of describing the damage is to determine the book condition. The object condition describes the general physical state of an object. The general physical state of an object is related to the materials, construction, structure, appearance, measurements and shape of the object. In determining the state, different types and categories of damage are summarised in order to reflect the summarised state indicators of the object. The best way to find summarised state indicators is to use the book condition calculator.

Damage indices have been introduced as a further tool for the conclusive quantification and rating of book damage. They complete the consistent approach to the characterisation, evaluation, quantification and rating of visible book damages and to risk prognosis and risk management.

According to the calculation modes, condition indices also range between 1 and 4:
1) not damaged;
2) partly damaged;
3) damaged;
4) severely damaged.

It should be noted that condition assessments do not go above four; i.e. all calculated results that are higher are rounded down to four. The algorithm is used to determine a book's condition index. The book condition index is an integrated indicator that characterises the book as a whole, taking into consideration the condition of the paper, the leaf attachment and the binding, as well as other examined features.

The interactive calculator enables users to browse through all aforementioned categories and subcategories. During examination of a book and determination of the extent of damages, users can checkmark proper values for each one. Possible values are illustrated by characteristic photos of the respective damage and its level. After marking all categories, users can review selected markings and make corrections if needed.

Figure 1. Example of the results of the evaluation of the condition of a book in the Book Damage Atlas.

Clicking "Calculate results" presents an overview of selected characteristics and values along with a summary of damages and the condition index of the described book. The results are not saved in a database, but the user can print the results out and store them for later use.

The Book Damage Atlas is proposed as:

- a handbook for the consistent categorisation of damage types and categories of books and of their relevant condition;
- a teaching tool for training library staff and conservators involved in damage assessments of books (using standard, pre-defined assessment criteria);
- a supporting tool for condition surveys of library collections;
- a tool for assessment of damage types and categories and condition of books;
- a teaching resource to be used at different levels in university courses in the field of library science or conservation.

In order to teach how to use the Atlas, an e-learning object has been created. Successful mastery of this topic will provide an understanding of damages to objects of cultural heritage and of the description of those

damages using books as examples, as well as the knowledge of how to use the Book Damage Atlas.[17]

Use of the Atlas thus far indicates that it is easy to learn how to use the Atlas and the structure of damages is intuitively quite comprehensible.

Database of Early Estonian Printings

The main objective of the creation of the Early Estonian Printings (henceforth EEP) database was to create a tool that would make it possible to arrive at an overview of paper and watermarks that were in use in Estonia during the early modern period. From the very beginning, the aim has been to create a database that can be expanded as conveniently as possible and to make data as easily available and usable as possible to other researchers. As such, the information in the database adds another possibility for researching texts. Secondly, more broadly speaking, the objective of the project has been related to book history – in other words, to foster the appreciation of researching the book itself as an object.[18]

The database brings together those copies of the nearly 1500 printings published by the *Academia Gustaviana* (1632–1656) and *Academia Gustavo-Carolina* (1690–1710) print shop of the Swedish-era University of Tartu and of Tartu-Pärnu that are deposited in Estonian libraries and archives. By the end of 2013, the database contained over 520 entries (including descriptions of about 157 watermarks)[19] from the collections of the University of Tartu Library, the University of Tartu History Museum, the Estonian Literary Museum, the Historical Archives and the University of Tallinn Academic

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[17] <http://www.e-ope.ee/_download/euni_repository/file/2700/Raamatute_kahjustused. zip/index.html> [accessed 12 February 2014].
[18] On this topic, see for instance: *Bull's Head and Mermaid: the history of paper and watermarks from the Middle Ages to the modern period: booklet and catalogue of the exhibition presented by the Landesarchiv Baden-Württemberg, Hauptstaatsarchiv Stuttgart and the Austrian Academy of Sciences, Kommission für Schrift- und Buchwesen des Mittelalters, Vienna*, ed. by Peter Rückert, Sandra Hodeček, and Emanuel Wenger (Stuttgart; Vienna: Landesarchiv Baden Württemberg; Austrian Academy of Sciences, 2009); *Early printed books as material objects*, Proceedings of the Conference organised by the IFLA Rare Books and Manuscripts Section, Munich, 19–21 August 2009, ed. by Bettina Wagner and Marcia Reed (De Gruyter Saur, 2009), *etc.*
[19] The quantity of watermarks can vary depending on the fact that sometimes it is not possible to unequivocally ascertain whether what we have is different watermarks or different parts of one watermark.

Library. Ene-Lille Jaanson's bibliography of University of Tartu publications from the Swedish era forms the basis for compiling the database.[20]

The standard for registering paper both with and without watermarks created by the International Association of Paper Historians (IPH) provides the most comprehensive answer for what parameters are essential for describing paper and the watermarks in it.[21] The use of the IPH standard would certainly be natural and advisable in every respect if the objective were to describe paper exclusively. Yet the methodological, and by virtue of this also the technical difference between EEP and other similar databases related to the history of paper[22] is its focus not so much on watermarks or paper but on copies as a whole. For the compilers of the database, paper is but one, albeit an important source of additional information to help achieve the goal of considering the publication in the context of its entire life cycle.

The entries in our database are associated with the databases of the Bernstein project *The Memory of Paper*,[23] within the framework of which an extensive digital environment for the expert analysis and history of paper has been created, combining Europe's more important paper and watermark databases under a single internet portal (20 databases have been combined as of the beginning of 2014). This kind of unified web portal

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[20] Ene-Lille Jaanson, *Tartu Ülikooli trükikoda 1632–1710: ajalugu ja trükiste bibliograafia = Druckerei der Universität Dorpat 1632–1710: Geschichte und Bibliographie der Druckschriften* (Tartu: Tartu Ülikooli Raamatukogu, 2000). The data in the bibliography (including concerning availability) has been continually supplemented in the course of compiling the database and photographing the watermarks.

[21] *International standard for the registration of paper with and without watermarks*, version 2.1 (Marburg: IPH, 2012) [henceforth IPH standard]. This is an extremely complicated enumeration of symbols and classificators several dozen pages long that makes it possible to convey information concerning how paper was manufactured, its physical attributes, and also the location, attributes, manner of reproduction, etc. of watermarks by using different combinations of letters, numbers and symbols. The standard is also available on the internet: <http://www.memoryofpaper.eu/products/IPHN2012E.pdf> [accessed 2 October 2013].

[22] *Briquet Online* [henceforth BO], <http://www.ksbm.oeaw.ac.at/_scripts/php/BR.php>; *Piccard Online* [henceforth PO], <http://www.piccard-online.de/start.php>; *Wasserzeichen-Informationssystems* [henceforth WZIS], <http://www.wasserzeichen-online.de/wzis/>; *Watermarks in Incunabula printed in Low Countries* [henceforth WILC], <http://watermark.kb.nl/page>; *Watermarks in Incunabula printed in España (The Hague, Netherlands)* [henceforth WIES], <http://www.ksbm.oeaw.ac.at/_scripts/php/wies.php>; *Thomas L. Gravell Watermark Archive*, <http://www.gravell.org/>; *Paperihistoriallinen tietokanta*, <http://kronos.narc.fi/paperi/index.php>, *etc.* [all databases accessed on 31 October 2013].

[23] Bernstein – The Memory of Paper, <http://www.memoryofpaper.eu:8080/Bernstein-Portal/appl_start.disp> [accessed 31 October 2013].

makes it possible to conduct searches either by region or by period, based on different materials (manuscripts, books, drawings, maps and layouts, *etc.*) as well as on the typology of watermarks. The identifier of our database on the Bernstein portal is EEP (Early Estonian Printings).

Description of fields in the database

The Estonian Early Printings database allows entries to be browsed based on certain traits and makes it possible to carry out both general and precise searches. The option is also available to search according to given criteria, like for instance the classification of watermarks or the place where they were printed.

The first level in the database is the division Copy – Paper – Binding. The last of these currently exists only in name. Work has yet to begin on establishing the criteria for describing the binding of publications.

Considering international interest, the database is designed keeping in mind multilingual use. Categories are described in Estonian and English (it is also possible to add languages later) so the search engine responds to queries in multiple languages.

Copy. The primary and most important principle in describing the copy is that in the case of publications, evaluation is based not on the edition but on every particular extant copy. Each copy is also given a unique entry number upon its entry in the database. The number of the description of the watermark and the binding will also be tied in to the entry number later.

The bibliographical data of each copy is entered (characterisation of the publication in terms of genre, in other words item type, title, date and place of publication, name of the printer, format,[24] number of pages, place where it is deposited), technical particularities related to printing (decorative elements used, vignettes, and other such features), known availability in other libraries and commentaries on reprints or publishings. If access to the full text is available in the Repository for Electronic and Digitised Research Materials, Theses and Books at University of Tartu (DSpace), a

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[24] The basis for the calculation of the publication's format in the case of old publications is the number of leaves obtained from one sheet when folding the paper. The publications in this database are mostly in the quarto (4°) and octavo (8°) formats, accordingly then a sheet folded twice that results in obtaining 4 leaves and 8 pages, or a sheet folded three times with 8 leaves and 16 pages. In the case of very small publications, the most widespread practice is the folio format folded one time (2°) or the use of a sheet of paper that is not folded at all. In this case, the publication is in broadsheet format (1°).

corresponding reference is added. The condition of the copy is also evaluated using the evaluation criteria provided by the Book Damage Atlas as a basis.[25] If possible, photographs of the copy's title page, noteworthy typographical decorations, and its binding are added to the entry.

PAPER. The paper subdivision brings together information on the paper used in printings. The general quality of the paper, its possible origin, and all the watermarks in each particular copy are described one at a time. The IPH standardised basic classes of watermark typology are used in the description of watermarks. A free-form description and dimensions of the watermark, information on the density of chain lines and laid lines, and references to possible connections to other watermarks are also included.

The division of paper begins first with three attributes common to the entire copy: the size of the sheet (leaf), the existence of watermarks, and the edge of the paper.

The size of the sheet (leaf) is not the original size of the sheet of paper; rather it is the size of one leaf in the publication. Since uneven deckle edges were cut to produce straight edges in the course of printing and binding, the original size of the sheet of paper can only be approximated. Some general rules are indeed known and in use, according to which the bound printing's leaf size, paper folding pattern, watermark and the lines of the wire meshing of the paper mould[26] can be used to calculate the possible original size of the sheet of paper when it was manufactured,[27] but this is nevertheless too speculative information to present it as a definite value. Besides, the necessary parameters are given, so as to enable other researchers to process the data themselves.

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[25]   The Book Damage Atlas, <http://paber.ut.ee/EN/raamatukahjustused/> [accessed 20 February 2014]. The paper's mechanical condition and its chemical condition are evaluated on a scale of 1–4, thus arriving at the total condition of the paper: the condition of the attachment of the book's textblock, the condition of the binding and a general appraisal of the condition of the printing is given on the basis of all the above-mentioned information.

[26]   A rectangular wire sieve mounted on a wood frame, fitted the deckle (a removable wooden rim which could be fitted on to the mould to make it into a tray-like sieve with a raised edge),

[27]   Thus for instance, depending on format, 0.5–2 cm is added to the sheet size of a print that has been cut to size to obtain the approximate original size, see Philip Gaskell, *A new introduction to bibliography: the classic manual of bibliography* (Delaware, New Castle: Oak Knoll Press, 1995), 84ff.

The description of the edge of the paper is important in connection to the preceding point and helps to restore the original size of the sheet of paper and the folding scheme that was used.[28]

There are also fields in the database for indicating the type of paper and paper mould type. These are meant for descriptions of attributes arising from the manufacturing method of handmade paper. The first field differentiates between vergé (laid) paper (where chain lines and laid lines are visible) or wove (vélin) paper. In the former case, it is indicated wherever possible whether the paper mould used had a single screen (meaning that darker shadows are visible under the chain lines that occurred from the more uneven seepage of water through the paper mass) or a double screen, where the water seeped out of the screen more evenly and such shadows did not develop.

Description of paper. This field was added so that it would be possible to describe the paper's other physical attributes in addition to watermarks, such as for instance defects and substances visible in the paper, the formation of the paper fibres, the hue and thickness of the paper, etc.

WATERMARK. When the existence of a watermark is indicated, the next level of description opens up in the database, where separate entries are made for every watermark in the print. Every watermark is automatically assigned a marker that is tied to the copy number (the watermark is added with a diagonal slash). It is at this point important to recall that watermarks found in printings are only partially visible depending on format (see Fig. 1 on p. 100 in this collection) and it is not always possible to state with any certainty whether the watermark fragments visible in a print belong together or originate from different watermarks, meaning that the paper under consideration is different. In such cases, every fragment is entered into the database as a separate watermark and the database compiler adds a reference in the comments field indicating that it may possibly belong together with some other watermark fragment in the same print.

The classification of watermarks has been one of the most complicated and contradictory problems for researchers through the years. During the time when the first great collections were established (Briquet, Piccard), a clear system with an unambiguously comprehensible hierarchy was of primary importance. In the case of the catalogues printed in those times

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[28]   In practice, this kind of approach is made more difficult since in many publications, only one edge is left uncut while at the same time the other edges are cut, and thus it is not possible to precisely calculate the original size of the sheet.

it was directly connected to finding and identifying watermarks. Several new search options have become available in contemporary electronic databases and the hierarchical system is no longer the primary means for finding watermarks. Yet bearing in mind the compatibility between databases and the general comprehensibility of search criteria, it is nevertheless important to have a generally recognised system as a basis. The principle of the great paper history catalogues has been to use one definite method of description that can be based on the standardised designations of single motifs of watermarks[29] and also on the principle of moving from the general to the specific in conducting picture searches among systematised images.[30] If we consider the essentially unlimited number of combinations of motifs that are conceivable in one watermark, the weak point of these kinds of classifications is often illogicality and little intuitivity outside circles of paper and watermark specialists (for instance, whether to search for a sign consisting of lions holding a coat of arms under the keyword fauna or under coat of arms). And the main deficiency is that the image of the watermark itself is left with only an illustrative role. Many smaller databases have worked out independent systems for classification and description based on their preferences, objectives and possibilities.[31]

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[29]   *The English Typological Index* presented by Allan Stevenson in Briquet's jubilee catalogue from 1968 continues to be one of the most frequently used classifications of watermarks to this day. It is used, for instance, by WILC, <http://watermark.kb.nl/index.html> [accessed 3 October 2013]. Here, watermark motifs are divided up into 39 groups in alphabetical order (from "acorn" to "wheel", ending with a miscellaneous group) and many subgroups. The subgroups follow their own system to a certain extent: the larger the main group, the more subgroups will branch from it.

[30]   The "Browse Motif" function implements the watermark classification scheme based on the databases PO, WZIS, WZMA, and some other watermark repertories. It allows browsing through the classification hierarchy by names or icons and alongside the simple search, this is also the primary search system in the *Bernstein portal* <http://www.memoryofpaper.eu:8080/BernsteinPortal/appl_start.disp#> [accessed 20 February 2014]. Additional information on different classification systems: Erwin Frauenknecht, Maria Stieglecker, "Das Projekt Wasserzeichen-Informationsystem (WZIS): Innovative Wege bei der Erfassung und Präsentation von Wasserzeichen," *IPH Congress Book, Yearbook of Paper History*, 19 (2012), 25–34 (30–31).

[31]   For instance *Paperihistoriallinen tietokanta* created at the Finnish National Archives <http://kronos.narc.fi/paperi/index.php> [accessed 20 February 2014], see Istvan Kecskeméti, "EVTEK Paper Identification Database: a novel tool for characterising and documenting handmade and modern papers," *Papierrestaurierung*, 7:3 (2006), 19–25; *Corpus de Filigranas Hispánicas* created at the Institute of Cultural Heritage of Spain, which is structured following basically the norms of the IPH and is capable of interconnection with other databases, see Maria del Carmen Hidalgo Brinquis, Mª Dolores Diaz de Miranda y Macias, O.S.B.,"La creation d'un Corpus des Filigranes Hispaniques en linge," *IPH Congress Book, Yearbook of Paper History*, 19 (2012), 169–174; *PHILIGRAN*

The International Association of Paper Historians (IPH) worked out the "International standard for the registration of papers with or without watermarks" in 1992, a second supplemented version of which has been issued by now. This standard is based on the following conditions (i.a.): Watermark is understood to be any mark which appears in the sheet of paper where there is a difference in sheet thickness regardless of how it is produced or of the grade of paper or depression (wire or other elevation on the mould, impression on the wet or dry sheet of paper, hand- or machine-made paper); [...] A short description of the object is compulsory; the bibliographical and codicological description of the object, as complete as possible, has to be stored in a separate data file.[32]

The Watermark Initiative and Archive of Papers in Greek Manuscripts has been the pioneer in using the IPH standard for registering paper and applying the categorised database principle, while at the same time directing attention to description of the manuscript as a whole as comprehensively as possible.[33]

We have tried to find a middle ground in working out the principles for describing watermarks in the paber.ut.ee database, adopting individual aspects from the IPH, the Bernstein portal and the Paper Identification Database while at the same time bearing in mind the objective of improved compatibility with the Bernstein portal.

In the database, the description of a watermark begins with the classification of the motif depicted in it according to the main IPH groups.

The IPH standard has divided watermarks into 25 main classes on the basis of the motifs depicted in them and these in turn have been divided further into numerous subclasses. At the same time, this categorisation is rather subjective and at times logically problematic. For instance, the "postal horn" motif that is often found in the paper in printings printed in Tartu can be found under the IPH category O – *Musical instruments*, instead of being categorised in group N – *Tools, equipment, clothing*.[34] The image of the fool's cap is included in group A – *Human figures; men; parts of the human body*, while this sign can be found less frequently in group N as well – *Tools,*

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database, describing watermarks found in original seventeenth century archival documents found in Québec and other Canadian collections, see Céline Gendron, "XVIIth century watermarks in New France: a contribution to the development of databases for the retrieval and identification of watermarks," *ibid.*, 53–62.

[32] See <http://www.paperhistory.org/standard.htm> [accessed 20 February 2014].

[33] *Archive of Papers and Watermarks in Greek Manuscripts*, <http://abacus.bates.edu/wmarchive/> [accessed 20 February 2014].

[34] *IPH standard 2.1*, Appendix 1: Index of Watermark Classes and Subclasses.

equipment, clothing, etc. The next round of problems arises when the water-mark consists of several motifs, each of which belongs to a different class. Some databases have adopted categorisation into main and additional motifs[35] but setting one image apart from another hierarchically in this way is once again too subjective (for instance, lions holding a coat of arms – which is the primary, which is the secondary sign?). This sort of approach does not take into consideration new meanings that can arise from combinations (for instance, lions holding a coat of arms with three St. Andrew's Crosses form the Arms of Amsterdam) and would in the course of searching lead to confusion and questions.

Even though the IPH categorisation has been subjected to the above-mentioned pertinent criticism,[36] no other system has nevertheless thus far been worked out that can be adapted better to the objectives of our database. Based on the need to conform with other similar databases as well, the categorisation of watermarks according to the 25 major classes worked out by the IPH is justified.

Each motif appearing in a watermark is assigned its IPH class in the paber.ut.ee database regardless of its place and importance and they appear in alphabetic order in the search results.

In order to compensate for the shortcomings pointed out above for the exhaustive classification of images found in watermarks, we have added a free-form description of the watermark to the database where the motifs found in the watermark are named in just the kind of order and hierarchy that appears to be logical to the person compiling the database (for instance, two standing lions holding a coat of arms). The search is lemmatised, meaning that inflected forms of words are also found.

The importance of developing necessary watermarks vocabulary emerges in two aspects: 1) firstly, it contributes to developing terminology that has to a great extent been lacking thus far in Estonian. Definite designations have evolved in international usage concerning watermark motifs (for instance, fool's cap, fleur-de-lis, *etc.*) and also other relevant

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[35] See for instance *Thomas L. Gravell Watermark Archive*, <http://www.gravell.org/>, the IPH standard also recommends using the same kind of approach (*IPH standard 2.1*, point 5.1).

[36] See for instance Neil Harris, *Paper and watermarks as bibliographical evidence*, <http://ihl.enssib.fr/en/paper-and-watermarks-as-bibliographical-evidence/briquet-and-switzerland-s-contribution-to-world-history> [accessed 20 February 2014]; *Commentary and interpretation of the IPH standard with proposals for a WWW distributed database system*, <http://abacus.bates.edu/wmarchive/wm-initiative/iph-commentary.html#3.1.4.> [accessed 20 February 2014].

terms (for instance, chain and laid lines, deckle edges, twinmarks, *etc*.). Such terms, however, have thus far been translated into Estonian only randomly and without any uniform system. In order to allow the terminology used to take root or to provide the opportunity for discussing it more broadly, a glossary is being prepared in parallel with the database[37] which will include not only the Estonian equivalents for watermark motifs found in the database but also general terminology related to the history of paper. The glossary will be added to the database website in the near future and it will be possible to continuously update it. 2) Secondly, the translation of watermarks description into English is of crucial importance. Here possibly relevant results in conducting searches as well as compatibility with terminology in the Bernstein portal have to be taken into account. Problems have already been encountered in this respect, for instance different options for describing one and the same concept (coat of arms vs. shield), presenting plural forms (lion vs. two lions) or the use of punctuation marks between different entry elements (two lions, coat of arms, crown), which may prove to be circumstances hindering the attainment of correct results when conducting searches by way of the Bernstein portal.

The problem is unfortunately broader than the use of terms in our database. The best solution currently is to use the character string search in the Bernstein portal, and in EEP enter descriptions in English on nominative singular case. Since watermarks often consist of motifs that the viewer may not necessarily comprehend unambiguously, in such cases all possible designations are added (for instance, coat of arms – shield, snake – serpent; house – tower – church, *etc*).

One further set of problems that arises from describing watermark details is associated with the correct position of the watermark (for instance – a fool's cap looking left or right). In order to ascertain this, it should be remembered that the watermark image is a mirror image on the paper mould used for making a sheet of paper so that it would be transferred to the paper in its correct orientation. The viewer, however, sees it in its

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[37] An analogous glossary has also been compiled at the Bernstein portal, where watermark motif designations are currently available in seven languages (English, French, German, Hungarian, Italian, Russian and Spanish): Erwin Frauenknecht, Carmen Kämmerer, Peter Rückert, Maria Stieglecker, *Watermark – Terms. Español – English – Français – Deutsch – Italiano – Русский – Magyar: vocabulary for watermark description*, version 9.1h (Vienna, 2012), also available at <http://www.memoryofpaper.eu/products/watermark_terms_sp.pdf> [accessed 3 October 2013]. The latest version of the IPH standard similarly includes reference to a list of conformance of IPH terms to the Bernstein and WZIS databases (see *IPH Standard 2.1*, Appendix II.3: Concordance of the most important terms of watermark and paper history used in online data exchange).

Figure 2. Example of a watermark entry in the EEP database.

correct orientation only if the paper is viewed from the correct side (that is the mould side). In order to determine which side of the paper is the mould side and which is the felt side used for draining the paper, the surface of the paper should be examined closely in order to find structural differences, or alternatively – the positioning of the watermark on the sheet of paper should be analysed. In the case of a print, this again requires the reconstruction of the original layout of the sheet: if the watermark is in mirror image and located on the right side of the paper mould, then if we look at paper from the side of the mould, we will see the watermark in its correct orientation on the left side of the sheet of paper. In the case of twinmarks,[38] however, the opposite is true since the watermarks of the twin moulds were sewn to the opposite sides of the moulds. If we look at the paper from the mould side and place the watermark in an upright position, it is possible

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[38]   In order to speed up the work, two paper moulds were usually used alternately in paper mills for working at one vat – while the coucher (the worker who transfers sheets of wet pulp to the couch) took one completed sheet of paper from one paper mould and laid it out to dry, the vatman was already drawing a new sheet from the paper mass using the other paper mould. These moulds used in parallel, in other words twin moulds also bore watermarks with the same motif as a rule – similar but not identical. For further information about twinmarks: Allan H. Stevenson, "Watermarks are twins," *Studies in Bibliography*, 4 (1951/52), 57–91.
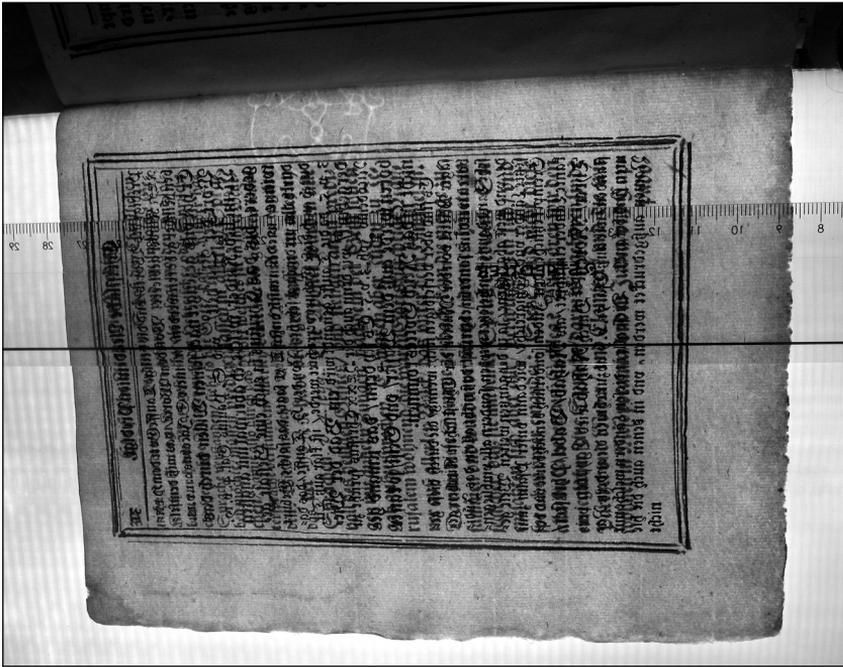
Figure 3. Leaf from a print where the leaf's original edge and watermark are visible.

to describe one of the pair of marks as the left mark, in other words the mark that is closest to the left-hand short side of the leaf. The other mark can be considered the mark located on the right, in other words the mark that is closest to right-hand short side of the leaf.

This is a very complicated task in the case of printings where the products of several different batches of paper are often combined into one publication and the scheme according to which they are folded, in other words their location in the textblock, can vary in several respects. Thus it is possible to ascertain the so called correct side of the paper only in the case of images that can be viewed only in one way (letters) or in cases where the paper's original edge has been preserved and it is possible to determine the location of the watermark in terms of it (see Fig. 3).

Text/letters in a watermark. Single letters, abbreviations, designations or parts of them, and other such features are found in the watermark under consideration. Here it is important once again to keep track of which side of the paper to look at. In the event that the shape of a letter is unclear or

there are several possibilities, a question mark is added to the corresponding letter (for instance, one of the more frequently occurring dilemmas is whether the letter in question is "M" or "W," especially if it is alone or together with letters that read the same when upside down like I, O or X).

Spacing between chain lines and density of laid lines. It is a generally recognised truth among paper historians that the watermark is not only the image created in the paper using wire sewn to the paper mould, but it is also the traces in the paper of the wire mesh of the paper mould itself – in the case of laid paper, these are vertical chain lines proceeding parallel to the shorter edge of the paper and with wider spacing, and more closely spaced laid lines created by horizontal wire meshing. The location of these lines is unique in the case of each mould – all paper moulds at that time were made by hand. Distinctive traits also derived from how intensively the mould was used and its deformation, which could alter both the shape and the elements of the watermark (some elements could be lost in the course of use). Ideally, the distance of the chain lines should be given starting from the left edge of the paper over the extent of the entire sheet[39] but since the edge of the paper is rarely found in publications in uncut form, in this entry we have confined ourselves to measuring the intervals of those chain lines in the range of which the image of the watermark is located (reading from left to right and recording the distance in centimetres). The density of the laid lines is usually measured from the edge area of the printed page that is not covered by print. The density of laid lines is recorded as the number of such lines per centimetre.

Size of the watermark. In the case of watermarks, the height of the image is recorded first and thereafter the width of the image in millimetres. Thereat, it is practical to measure the height only in the case of printings in folio or poster format since the images are not fully visible in other formats and are partially in the middle of the spine fold. In such cases, the width of the visible fragment only is recorded. The value of the height is replaced in the entry with a question mark.

The placement of the watermark on the sheet describes the location of the watermark depending on the scheme for folding the paper and the format of the printing: in the case of the folio format, the watermark is located in the middle of the leaf, in the case of the quarto format, it is in the middle of the spine fold, in the case of the octavo format, it is at the

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[39]   Bland, *A guide to early printed books*, 41.

head of the spine fold, in the case of the long duodecimo format, it is at the head of the leaf, etc.

WATERMARK LOCATION. This refers to the location of the watermark in the publication. Instead of page numbers, the signature letter of the gathering and the sequential number of the leaf in the sheet are used (for instance A2, meaning the second leaf of gathering A). If both sides of the watermark belong together with 100% certainty, both leaves are indicated as the location where part of the watermark is located (for instance A1–A4).

COUNTERMARK. In the middle of the seventeenth century, a secondary mark, or countermark was added to the main watermark made in the paper – this was usually located on the right side of the sheet. From that point onward, it was common for the main watermark, the so called mark that gave the paper its name, to be located on the left side of the sheet, and the countermark on the right side of the sheet as a reference to the vatman, the paper mill or its owner. The countermark field in the database allows the mark to be described in free-form text and to tie it in with the main watermark through the commentary.

PAPER QUALITY. The summary assessment given through visual observation sets apart good quality paper as paper with a light hue, smooth surface and uniform fibre density free of raw material residue and/or defects arising from unskilful manufacture that are visible to the naked eye. Poorer quality paper, on the other hand, is darker (more grey or brown) with a rough surface (see Fig. 4), poorer formation of fibres and look-through, uneven fibres or small knots are visible in the paper's structure (giving it a cloudy look). It is important to relate the evaluation to other papers in the same context (found in the same printing or bearing similar watermarks). The assessment is given first and foremost to the paper's original quality attained in the manufacturing process: the aim is to set aside later damage arising from improper preservation conditions or other such factors here.

WATERMARK IMAGE. This is undoubtedly one of the most important items of information in the database that all the other fields are meant primarily to explain and supplement. A number of problems once again is involved in the reproduction of a watermark. First of all, the paper that was used is covered with text, print or other information which is of primary importance to historians but is more of a hindrance to paper historians. As has

Figure 4. Two copies of *Oratio de natura et vigore ingeniorum Septentrionalium…* published in Tartu in 1691 that are printed on paper that is clearly of different quality.

already been discussed previously on several occasions, in the case of books, the paper has additionally also been folded in half, in quarters or even in eighths as required by the particular format in use and thus the watermark is only partially visible. While even a couple of dozen years ago the prevalent methods for reproducing watermarks were either tracing or rubbing a soft graphite pencil on thin paper placed on top of the image, nowadays many techniques have been experimented with that apply the different possibilities offered by electron radiography, dulyx proofing paper and digital photography, each of which has its own positive and negative aspects.[40] Considering time and material expenditure, the most practical approach for the database proved to be the utilisation of photography using

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[40]   Peter Meinlschmidt, Volker Märgner, "Advantages and disadvantages of various techniques for the visualisation of watermarks," *Restaurator*, 30:3 (2009), 222–243; D. Stewart, R. A. Scharf, J. S. Arney, "Techniques for digital image capture of watermarks," *Journal of Imaging Science and Technology*, 39: 3 (1995), 261–267; I. Christie-Miller, "New tools for old paper," *Book Collector*, 58:3 (2009), 383–389; Georg Dietz and Marieke Delft, "Imaging technologies for watermarks," *Bull's Head and Mermaid: the history of paper and watermarks from the middle ages to the modern period: booklet and catalogue of the exhibition presented by the Landesarchiv Baden-Württemberg, Hauptstaatsarchiv Stuttgart and the Austrian Academy of Sciences, Kommission Für Schrift- und Buchwesen Des Mittelalters, Vienna*, ed. by Peter Rückert, Sandra Hodeček, and Emanuel Wenger (Stuttgart; Vienna: Landesarchiv Baden Württemberg; Austrian Academy of Sciences, 2009), 67–69.

Figure 5. Fibre Optic Light Sheet used in photographing with backlighting.

backlighting, using a digital camera and a special Fibre Optic Light Sheet that does not get hot and does not emit ultraviolet radiation that could damage the paper (see Fig. 5).

Images of watermarks obtained by this kind of method of lighting through the paper are sufficient for obtaining a general impression yet a more detailed study is hindered by the text printed on the page that partly covers the watermark. Future plans include the addition of watermark images obtained using other methods (infrared photography) to the database. Within the framework of our project, we have experimented with photographing printings using electron radiography methods, as a result of which it is possible to obtain images of watermarks free of obscuring print from closed book bindings as well.[41] Yet this method requires rather

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[41]   For further information on this, see Charles F. Bridgman, "Radiography of paper," *Studies in Conservation*, 10:1 (1965), 8–17; J. van Aken, "An improvement in grenz radiography of paper to record watermarks, chain and laid lines," *Studies in Conservation*, 48:2 (2003), 103–110; the use of this method has achieved good results for the WILC database compiled at the Royal Dutch Library, see WILC: reproduction methods, <http://watermark.kb.nl/page#reproduction> [accessed 3 October 2013].

expensive and specific technology[42] and requires the deposition of printings in large quantities. Thus the use of x-rays has not yet proved to be practical in the work of describing the given quantity of printings. At the same time, we plan to continue experimenting with different methods since the opportunity to add many images of watermarks helps to obtain as good an overview of a watermark and its location in a document as possible.

The current photographs taken with backlighting have been made from the side of the leaf in the printing that is better accessible. This means that the positioning of the watermark in its "correct orientation" is not always followed. Instead, the position of the leaf that can cause the least damage to the binding is preferred. Photographs of the chain lines and laid lines are also added if they are sufficiently visible. All photographs are provided with a scale. Generally speaking, we have added as many photographs as possible with the aim of providing every researcher with the opportunity to analyse the watermarks themselves. To this end we have also included less instead of more of our own subjective interpretation in other data. The enhancement of the image of the watermark to achieve the kind of precision to make it machine-readable so that image identification programmes can be applied to the images is a topic for the future. That would make it possible to conduct very precise searches and thus help to identify identical or similar watermarks. This kind of technology has thus far been used primarily in criminology but will very likely become an everyday tool for paper historians as well in the future.[43]

Public user interface of Estonian Early Printings

The following functions are available to users. Simple search is a text-based search where the entered text string is searched from all searchable fields (title, authors, place of publication, printer, current location, description of watermark). Search results are presented in the form of a table, arranged on pages when the number of found records exceeds 25. It is possible to change the number of results per page and browse pages with links to first, previous, next and last page or selecting pages by number. Users can narrow their search by applying new search terms in each turn. The database was

[42]   At this point we would like to thank the archaeologists at the University of Tartu, who have kindly allowed us to use their x-ray apparatus for this work, and technician Andres Vindi, whose valuable working time we have used in the course of these experiments.
[43]   John P. Eakins, A. Jean E. Brown, Jon Riley and Richard Mulholland, *Evaluating a shape retrieval system for watermark images*, <http://www.chart.ac.uk/chart2001/papers/noframes/mulholland.html#10> [accessed 28 February 2014].

initially populated by importing data from Zotero RDF format. Advanced search adds the option of combining multiple keywords based on OR / AND logic as well as specifying the search field (title, person, place of publication, description of watermark, number of watermarks) for each. In addition, different filters can be applied: category of watermarks, format, place of publication, location and book condition index. The results can also be limited by time period entering the beginning and end as years. Keywords used for searching are highlighted in the results table. It is also possible to browse the database arranged by categories. The browsing set "items" includes all records in the database; "Authors" presents an alphabetic list of all authors, enabling access to data on each particular author; "Issued place" displays a list of all places; "Watermarks" filters out only those copies that have the watermarks described; Each particular record is described by all of the fields described above, organised in the sections "Item info" and "Paper". Thumbnails of general images are presented on the "Item info" page. Clicking on a thumbnail enables the user to zoom in on the image. The page with information about watermarks is similar – descriptive fields of all characteristics and zoomable images.

Each table from either the "Item info" or "Paper" page can be printed out separately. Clicking the "Print" icon prepares a printer-friendly pdf version of the table and opens it in a popup window. It is also possible to create a printout of the whole record including "Item info" and "Watermarks".

All records have a unique URL to enable direct access to each particular record. They are also provided with standardised COinS code, enabling users to store the structured data e.g. in their own Zotero database.

Integration with Bernstein Portal

MySQL was used as the database platform for storing Estonian Early Printings data. The database consists of two main tables – items and watermarks that are related through one-to-many relationships (i.e. one item can have multiple watermarks). In addition there are multiple tables used for IPH, categorisation, location and other descriptive fields and photographs.

Integration with the Bernstein database required two additional main modules for the EEP database: providing the database with a structure according to Bernstein requirements and describing database fields in the XML configuration file. According to specifications provided by the Bernstein portal, the required database structure differed to some extent from the EEP internal data structure. To maintain the current structure of EEP

and provide a gateway for Bernstein queries, additional database views were generated. The Bernstein portal needs to access these views directly, performing MySQL database queries on port 3306. As the queries source from a particular IP address, this particular port was opened in the network firewall of the University of Tartu for that IP. Next, to be able to map required fields with fields in EEP database views, the following XML configuration file was created. It describes data tables used, linking fields and sets of fields for searching data.

Perspectives

The primary result of the EEP database can be considered to be the linking of information on Estonian watermarks and paper to European-wide electronic watermark databases – thus it has become possible to examine Estonian watermarks in the context of European paper manufacturing, which is the only reasonable way to study the history of paper as paper production and trade were conducted all over Europe. The distinctive feature of the EEP database is the fact that in addition to descriptions based on the IPH standard, a free-form description is also provided for each watermark. Thus watermarks can on the one hand be searched for and found in unified databases, yet if there is further interest in a particular watermark, it is possible to obtain more information about that and about the paper it is in. The relatively small number of watermarks found in Estonia makes this kind of approach possible, compared to massive databases like Briquet, Piccard, or WZIS, where free-form searches may cause unnecessary confusion. Tying the paper and watermark in with the printing where they were used provides the researcher with additional information and this opens up possibilities for studying the relationship between the nature of the paper and of the printing. There are plans to expand the database in the future and to add descriptions of the bindings to the existing descriptions of the printings. A glossary is also being compiled that contains terminology associated with the history of paper. In this way, the EEP project has set as its objective the provision of a description of each particular printing that is as thorough as possible, directing attention to its various details. It is hoped that in this way, the EEP project will help to promote more extensive research of the history of paper and books in Estonia.

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Kokkuvõte: *Eesti varajaste trükiste andmebaas ja Raamatu-kahjustuste atlas*

Artikkel annab ülevaate projekti "Vesimärgid ja paber varauusaegses Eestis" raames loodud Eesti varajaste trükiste andmebaasist (EEP) ja Raamatukahjustuste atlasest ning selle käigus üles kerkinud küsimustest. Atlas ja trükiste andmebaas moodustavad terviku, kus atlas funktsioneerib trükiste andmebaasi juures täiendava analüüsivõimalusena, olles orienteeritud eelkõige vanaraamatu juures esinevate kahjustuste hindamiseks, kuid võimaldades hinnata raamatu seisundit sõltumata selle vanusest. Kuna projekti eesmärgiks oli saada ettekujutust raamatust kui eksemplarist ja selle osade omavahelistest seostest, siis mängib selle juures rolli ka raamatu praegune seisund, mis ühendab endas nii raamatu valmistamise kui ka raamatu säilitamise juures tehtud otsuseid, mille oluliseks osaks on raamatukahjustused.

Selline lähenemine ongi üks Eesti varajaste trükiste andmebaasi iseärasusi. Erinevalt paljudest teistest vesimärkide andmebaasidest keskendub EEP mitte niivõrd vesimärgile või paberile, vaid just trükise eksemplarile kui tervikule. Eesmärgiks on kirjeldada trükist nii ajaloolise, kirjeldava kui ka analüütilise bibliograafia eesmärke silmas pidades ning püüda seega esile tõsta Eestiga seonduvate varauusaegsete raamatute säilinud eksemplarid oma erinevate kirjeldusviisidega saavutatavas detailirikkuses. Samal

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ajal on püütud andmebaasi koostamisel arvesse võtta, et põhimõte väärtustada eksemplari kui tervikut ei tohiks saada takistuseks üksikelementide uurimisel (nt vesimärkide kunstiajalooline või ikonograafiline kirjeldamine jms) ning statistilisel analüüsil, mis jätab kõrvale tekstikandjate individuaalsed omadused. Sealjuures on tähtis, et oleks võimalus lisada baasi ka uusi andmeid vastavalt sellele, kuidas tehnoloogilised vahendid seda lubavad või milline on parajasti uurijate huvi. Lähtuvalt sellest on algusest peale olnud sihiks luua andmebaas võimalikult hästi laiendatav ning teha andmed võimalikult kergesti teiste uurijate jaoks kasutatavaks ja kättesaadavaks nii tehnilisi kui ka keelelisi võimalusi silmas pidades.

Elektroonilised andmebaasid lubavad mitmeid uusi otsinguvõimalusi võrreldes traditsiooniliste trükitud vesimärkide kataloogidega ning seetõttu on kerkinud üles küsimus, kuidas oleks kõige otstarbekam vesimärke kirjeldada nii, et need oleksid leitavad ühendatud otsingute abil. Rahvusvaheline Paberiajaloolaste Assotsiatsioon (IPH) töötas 1992. aastal välja standardi nii vesimärke sisaldava kui ka mittesisaldava paberi kirjeldamiseks, millest on nüüdseks ilmunud teine, täiendatud versioon. IPH standard on jaganud vesimärgid neil kujutatud motiivide alusel 25 põhiklassi ning need omakorda arvukateks alamklassideks. Samas on see jaotus küllalt subjektiivne ja kohati ka loogiliselt vaieldav ning on pälvinud mitmel pool asjakohast kriitikat. Olles nendest puudustest teadlikud, kuid lähtudes vajadusest ühilduda teiste sarnaste andmebaasidega, on EEP kasutanud vesimärgi liigitamisel IPH poolt välja töötatud 25 suuremat klassi ning lisanud sinna ka omapoolse vabasõnalise vesimärgi kirjelduse, kus on nimetatud vesimärgil esinevad motiivid just sellises järjekorras ja hierarhias, nagu nad andmebaasi koostajale loogilisena tunduvad. Sellise kirjelduse eeliseks on võimaldada uurijal otsingut, mis lähtub talle tähelepanuväärsena tunduvatest detailidest ning ei nõua tingimata IPH klasside ja alamklasside nimetuste ja ulatuse põhjalikku tundmaõppimist, muutes selliselt vesimärgi kasutamise uurimistöös kergemaks ka uurijatele, kes ei ole vesimärkide sümboolika ja paberiajaloolise terminoloogiaga väga hästi kursis. Andmebaasi otsing on lemmatiseeritud, st leitakse ka sõnade käändelised vormid. Eestikeelsena on tegu suuresti seni puudunud terminoloogia arendamisega, kuna vesimärkide motiividel (nt narrimüts, liilia, piiskopisau jne), aga ka muudel asjassepuutuvatel terminitel (nt ahel- ja ribijooned, kaksik- ja vastasmärgid jne) on rahvusvahelises kasutuses välja kujunenud oma kindlad nimetused, eesti keelde on neid aga seni tõlgitud vaid juhuslikult ning ühtse süsteemita. Et kinnistada kasutatud terminoloogiat või siis võimaldada selle üle laiemalt diskuteerida, on paralleelselt

andmebaasiga valmimas ka sõnastik, kuhu kantakse mitte ainult andmebaasis esinevate vesimärgimotiivide eestikeelsed vasted, vaid paberiajalooalane terminoloogia üldiselt. Sõnastik lisandub andmebaasi veebilehele ja seda on võimalik jooksvalt täiendada.

Käesoleval hetkel koondab EEP Rootsi-aegse Tartu ja Tartu-Pärnu ülikooli *Academia Gustaviana* (1632–1656) ja *Academia Gustavo-Carolina* (1690–1710) trükikojas ilmunud ligikaudu poolteisttuhandest trükisest neid eksemplare, mis on hoiul Eesti raamatukogudes ja arhiivides. Andmebaasi aluseks on võetud Ene-Lille Jaansoni koostatud Tartu Ülikooli Rootsi-aegsete trükiste bibliograafia. Läbi töötatud eksemplarid on varustatud nii sõnalise kirjeldusega kui ka fotodega vesimärkidest, kasutatud on tagantvalgustusega pildistamise meetodit. Selline meetod ei anna sõltuvalt trükise iseloomust alati väga häid kujutisi, kuid on samas kõige kiirem ja väiksema töömahuga võimalus vesimärkide reprodutseerimiseks. Arvestades viimasel ajal välja arendatud tehnoloogiaid vesimärkidest kujutiste saamisel (nt infrapunafotograafia) on plaanis neid ka ise praktikas katsetada ning lisada andmebaasi ka mõne teise meetodiga saadud reproduktsioone. Samuti on plaanis andmebaasi laiendada nii ajalises kui ka geograafilises plaanis, piirdudes enam mitte ainult 17. sajandil ja Eestis ilmunud trükistega. Olemasolevale trükise kirjeldusele lisandub tulevikus ka köite kirjeldus.

EEP on loodud toimima inglise ja eesti keeles, kuid vajadusel on võimalik lisada ka teisi keeli. Andmebaasi kirjed on seotud rahvusvahelise Bernsteini projekti "The Memory of Paper" (memoryofpaper.eu) andmekogudega (meie andmebaasi tunnuseks portaalis on lühend EEP), mille raames on loodud laiaulatuslik paberiekspertiisi ja -ajaloo digitaalne keskkond ühendamaks ühe internetiportaali alla maailma olulisemad paberi- ja vesimärkide kogud. Selline ühtne veebiportaal võimaldab teostada otsinguid kas piirkonniti või perioodi, lähtudes nii erinevatest materjalidest (käsikirjad, raamatud, joonistused, kaardid ja plaanid jne) kui ka vesimärkide tüpoloogiast.