The *Speculum morale* (c. 1300) and the study of textual transformations: a research project in progress

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The *Speculum morale*, last printed in 1624 as the third of four volumes making up the the *Speculum maius* of Vincent of Beauvais, is an encyclopaedia of human behaviour, divided into three constituent books.[1] Yet because of the coincidence of identical text in the *Speculum morale* and the *Summa theologiae* of Thomas Aquinas the attribution to Vincent has been seen as problematic at least since the late fifteenth century.[2] In 1708 the French Dominican scholar Jacques Echard published a massive (668 pages) study of the work—arguments that he subsequently summarized within his continuation to Quetif's *Scriptores ordinis praedicatorum* (1719)—in which he demonstrated that the *Speculum morale* cannot have been written by Vincent of Beauvais.[3] Endowed with a prodigious capacity to recognise and identify Latin texts, and influenced by early Enlightenment notions of plagiarism, Echard described how he came upon this realisation in 1704 while working in the library of Saint-Victor. He argued that the *Speculum morale* had not only borrowed on occasion from Aquinas but the entire work had been plagiarized from the writings of various moral theologians from the thirteenth century: Thomas Aquinas (1225-1274), Etienne de Bourbon (d. C. 1261), Peter of Tarentaise (1225-1276), the Franciscan Richard of Middleton (c. 1249-1302), and an anonymous author of *Tractatus de consideratione novissimorum*. Echard's assessment of the *Speculum morale* as a derivative compilation has led to the work being largely neglected by subsequent scholarship.[4]

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[1] Vincent of Beauvais, *Bibliotheca Mvndi Vincentii Bvrgvndi Ex Ordine Praedicatorvm Venerabilis Episcopi Bellovacensis, seu Speculum quadruplex, sive speculum maius* (Douai, 1624; repr. *Speculum quadruplex, sive speculum maius*, Graz: Akademische Druck, 1964). To our knowledge, no digital transcription is publically available of the *Speculum morale*. Pending the development of high-quality optical scanning of the 1624 texts, only part of the work has been digitised, for research purposes.

[2] Joseph McCarthy, *Humanistic Emphases in the Educational Thought of Vincent of Beauvais* (Leiden, 1976), 2.

[3] Jacques Echard, *Sancti Thomae Summa suo auctori vindicata sive di Vincentii Bellovacensis scriptis dissertatio* (Paris, 1708); Jacques Quetif and Jacques Echard, *Scriptores Ordinis Praedicatorum recensiti notisque historicis et criticis illustrati* (Paris, 1719-23), vol. 1, 212-231.

[4] See, however, W. Gass, 'Zur Geschichte der Ethik. Vincenz von Beauvais und das `Speculum morale'', in: *Zeitschrift für Kirchengeschichte* 1 (1877), 365-396; 2 (1878), 332-365, 510-536; Johannes B. Voorbij, *Het*

This article summarizes a research project on the *Speculum morale* currently being undertaken at Monash University, Australia that seeks to rectify this situation. It considers the limitations of simply dismissing the work as 'plagiarism' and instead draws attention to the potential significance of studying how texts can be subtly transformed in the process of compilation. The project involves co-operation between medievalists and IT specialists in transforming what is commonly called plagiarism detection software into text similarity detection software, with particular relevance to Latin texts.

Speculum morale in the context of Vincent's other *specula*

Vincent of Beauvais dedicated the first of his *specula,* the *Speculum historiale,* to Louis IX in 1246/47 as a work in which ethical instruction was based on historical example. He originally planned to match it with *Speculum naturale*, but by the 1250s he was already preparing the *Speculum doctrinale* as a third part, and his final vision of his encyclopedic project may have included four volumes.[5] As Von den Brincken demonstrated, in a recension (H) of the *Speculum historiale* from 1250, Vincent was considering a four-book structure, which adapted the traditional tripartite division of philosophy into *naturale*, *rationale* and *morale* (attributed by Augustine to Plato), and supplemented it with *historiale*. As Vincent explained it the first dealt with nature, the second with doctrine (or the separation of truth from falsehood), the third with behaviour, and the fourth with the flow of time—strictly not part of philosophy, but generating admiration, refreshment and utility.[6]

Vincent's intention to write four *specula* could have played a role in the eventual acceptance of the *Speculum morale* among Vincent's authentic works. In 1304, Bernard Gui noted that the planned four-volume work did not materialize because of the immense size of the project, and claimed that Vincent had abbreviated moral and doctrinal matter into one volume.[7] Yet in the Magdeburg copy of the

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`Speculum Historiale' van Vincent van Beauvais. Een studie van zijn ontstaansgeschiedenis, (Ph.D. Groningen University) Groningen 1991, 32-33.

[5]Anna-Dorothee von den Brincken, 'Geschichtsbetrachtung bei Vincenz von Beauvais. Die 'Apologia Actoris' zum 'Speculum Maius', in: *Deutsches Archiv für Erforschung des Mittelalters*, 34 (1978), 410-499 , esp. 457-60.

[6] *Apologia Actoris*, ed. Von den Brincken, 490, quoting Augustine, *De civitate Dei* 8.4, CCSL 47. Vincent changed *rationale* to *doctrinale*.

[7] Von den Brincken, 462, reporting a gloss printed in Kaeppelli, *Monumenta Ordinis Fratrum Predicatorum Historica* 22 (1949), vi-viii and 34-35: 'Notum sit, quod ipse frater Vincentius facere quatuor specula disposuit, sed factis speculis naturali et ystoriali, cum immensa volumina essent, per suum superiorem sibi fecit impositum, quod alia duo, scilicet doctrinale et morale, abbreviaret, sicut idem frater Vincentius quodam loco dicit, propter quod materiam moralem et doctrinalem in unum speculum coartavit.' Gui's redaction of Bernard of Salagnac's *De quator in quibus Deus praedicatorum ordinem insignivit* (Rome, 1949, 34-35) presents Vincent as the author of a quadripartite *Speculum*: 'Fr. Vincentius Belvacensis compinxit opus insigne et famosum toti orbi a generatione in generationem quod quatuor speculis distinxit, vocans unum speculum naturale, aliud morale,

Speculum naturale (Berlin, Preussischer Kulturbesitz, lat. Fol. 76), produced 1320-60 and matching the copy of the *Speculum morale* (from later in the fourteenth century), an original reference in chapter 16 of the *Apologia* originally referred to the work being in three volumes (as in three other MSS), but *tria* has been corrected to *iiii^or*. This indicates that when scribes did have access to the newly composed *Speculum morale*, they did accept it as part of Vincent's project in a manner similar to the revision of the original bipartite project into three volumes.[8]

The *Speculum morale* was never as well diffused as the authentic works of Vincent, being known to survive in only four medieval copies (one of which is in two parts):

Mo 1 Berlin, Staatsbibliothek und Preussischer Kulturbesitz, Lat. Fol. 77 (s. Xiv) books1-3, from Magdeburg

Mo 2 Firenze, Biblioteca Medicea Laurenziana, Fiesole 140 book 1 (s. Xiv)

Mo 3 Firenze, Biblioteca Medicea Laurenziana, Fiesole 140 book 2-3 (s. Xiv)

Mo 4 Paris, Bibliothèque nationale de France*,* lat. 6427 book 1 (s. Xv)

Mo 5 Vaticano, Bibl. Apostolica Vaticana, Vat. Lat. 1176 (s. Xiv)

The 1624 edition of the *Speculum morale* was based on the *editio princeps* printed by Johann Mentelin of Strasburg in 1476, as part of a project to print the entire *Speculum maius*, assisted by his son-in-law Adolf Rusch (the first German printer to employ Roman rather than Gothic type face), who had previously published the *Speculum naturale* in 1473.[9]

The date of the *Speculum morale*

Because in book three of the *Speculum morale* Louis IX is referred to as *beatissimus*, it has been assumed that the work must have been written after his canonization in 1297— although it is just

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aliud vero historiale, quartum vero doctrinale, in quibus totum orbem, immo totum universum possunt legentes lucide fideliter speculari."

[8] Von den Brincken, 454.

[9] Mentelin also printed the *Speculum historiale* in 1473. The British Library, London, holds a copy (IC.552) of the *Speculum morale* [Strasburg: Johann Mentelin, 9 November 1476], as does Cologne, *Universitäts und Statdtsbibliothek* [Cologne: Conrad Winters, de Homborch, about 1477], available in a digital copy (ISTC Nr.: iv00289000) at http://inkunabeln.ub.uni-koeln.de/. The work was reprinted in Nuremberg by Anton Koberger, 6 February 1485, and in Venice by Hermann Liechtenstein, 30 September 1493.

possible that the term was interpolated into its text. In a section probably drawn from unedited sermons of pseudo-Bonaventure on the Four Last Things, it refers for example, to the recent Christian expulsion from the Holy Land in 1291.[10]

Although Von den Brincken suggested there was no firm evidence for the *Speculum morale* prior to 1324, Serge Lusignan argued that it was more likely to date from the early years of the fourteenth century.[11] Neither author was able to assess the significance of the discovery by Anne Dubrulle of extensive use of the *Speculum morale* throughout the *Speculum dominarum*, a vast work of ethical guidance addressed to Jeanne of Navarre (1273-1305) by her Franciscan confessor, Durand de Champagne.[12] Little is known of Durand's life and writing other than that he is first mentioned as confessor to the Queen in 1294, and that he also wrote a *Summa de confessoribus*, for which he achieved some acclaim.[13] Perhaps a third of the *Speculum dominarum* is made up of extensive quotation from the first and second books of the *Speculum morale*. While only a single manuscript survives of the original Latin version of the *Speculum dominarum*, at least ten copies survive of a French translation of that work (of which only the preface has been published), known as the *Miroir des dames*, and possibly produced by Durand himself.[14] If the *Speculum dominarum* was composed for Jeanne of Navarre, this must have been sometime before 1305. Its debt to the *Speculum morale* implies that Durand must have composed his work for the Queen sometime between 1297 and 1305, perhaps soon after the *Speculum morale* was written. His access to the *Speculum morale* c. 1300 raises the possibility that he moved in the same circles as its compiler.

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[10] *Speculum morale* II.ii.2, 765.

[11] Serge Lusignan, *Préface au `Speculum Maius' de Vincent de Beauvais: réfraction et diffraction*, Cahiers d'études médiévales 5 (Montréal-Paris 1979), 77-90.

[12] Anne Dubrulle, *Le Speculum Dominarum de Durand de Champagne*, 2 vols. Thèse presentée pour l'obtention du diploma d'archiviste-paleographe, Ecole nationale des chartes 1987-1988. I am indebted to Madame Anne Flottes-Dubrulle for permission to consult her thesis.

[13] Durand is mentioned as Jeanne's confessor in a document : E. Martène (ed.), *Thesaurus novus anecdotorum* (Paris 1717), vol. 1, 1268. The *Summa confessorum* is unedited except for extracts provided by Ulrich Neumann, '"Sacerdos sine Scientia est sicut ductor cecus...": Postulate zur charakterlichen und wissenschaftlichen Bildung des Beichtigers in der *"Summa Collectionum pro confessionibus audiendis"* des Durand von Champagne OFM – Einführung und Text', in: *Universität und Bildung, Festschrift Laetitia Boehm zum 60. Geburtstag*, ed. Winfried Müller, Wolfgang J. Smoka and Helmut Zedelmaier. PS–Serviceleistungen für Geisteswissenschaft und Medien (Munich, 1991), 33–44. Durand is mentioned as a significant figure in the Franciscan province of France by Bartholomeus de Pisa, *De conformitate vitae beati Francisci ad Vitam Domini Iesu* 1.11, Analecta Franciscana 4, Fathers of the College of St Bonaventure (eds.), (Florence, 1906), 545.

[14] Ed. L. Delisle 'Notice sur deux livres ayant apppartenu au roi Charles V', *Notices et extraits des manuscrits de la Bibliothèque nationale* XXXI.2 (Paris, 1884), 1-31; see also his entry, 'Durand de Champagne', in: *Histoire littéraire de la France*, 31 (Paris, 1888), 302-333; Catherine Louise Mastny, 'Durand of Champagne and the Mirror of the Queen: A Study in Medieval Didactic Literature', PhD thesis Columbia University 1969.

The period after the death of Aquinas was a period of great vitality in Franciscan circles, and the *Speculum morale* reflects that. In 1708, Echard had observed that the author often added Franciscan attributions to Dominican exempla compiled from Stephen de Bourbon's *Tractatus de diversis* (also known as *Liber de septem donis*), or replaced Dominican references with Franciscan ones.[15] The presence in the *Speculum morale* of extracts from Richard de Middleton (d. 1302), regent master in Paris 1284-1287, one of the first Franciscans to seek to adapt (not without criticism) the ethical ideas of Thomas Aquinas to Augustinian themes, traditionally more common in Franciscan thought, is also significant. In several places, to Echard's surprise and dismay, the *Speculum morale* prefers the treatment of Middleton to that of Aquinas. While there were traditionalist voices hostile to Thomas and the brand of Aristotelian thought he represented, there were others (like Richard de Middleton), who sought to develop an ethical system that combined Aristotelian notions of intellect with Augustinian ideas of will.[16]

Echard's dismissive attitude to the *Speculum morale*, with his satisfied conclusion that the author of such an unfortunate *farrago* was definitely not a Dominican, may have been important to gaining a more accurate perception of the ideas of Thomas Aquinas in the early eighteenth century.[17] His judgement that the work was simply one of plagiarism does not deal with the more significant implications of the *Speculum morale*: that a compiler, very likely a Franciscan, believed in the importance of completing Vincent's project of a series of *Specula* on all branches of human learning. Although Echard's analysis is thorough in identifying the major sources of the *Speculum morale*, more work needs to be done in identifying how the *Speculum morale* adapts existing texts. Echard's familiarity with the Latin literature of the thirteenth century was of a kind that is simply no longer found in a scholarly or ecclesiastical milieu, except in the most rarified of academic circles. In this context, it is important for medievalists and information retrieval specialists to work together to help develop software that is concerned not simply with identifying plagiarism, but with facilitating the study of large bodies of text that have been culled and adapted from earlier sources.

Plagiarism detection software

The large size of the *Speculum morale* and its sources, as well as the mostly verbatim borrowing of the compiler, make the encyclopedia an ideal subject for analysis by plagiarism detection software. This

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[15] Jacques Echard, *Scriptores ordinis*, 226-231; *Sancti Thomae summa*, 472-486.
[16] See T. Noone, 'Franciscan Attitudes toward Philosophy: 1274–1300', in: *Laudemus viros gloriosos – Essays in Honor of Armand Maurer*, ed. RE Houser (Notre Dame, IND, 2007), 238-253; Bonnie Kent*, Virtues of the will : the transformation of ethics in the late thirteenth century* (Washington DC, 1995), 16-18, 88-91.
[17] *Sancti Thomae summa*, 100-101, 486.

project uses software built upon the experience with the Damocles[18] program developed by David Squire of Monash University. Damocles was initially devised in 2000 and is currently widely employed at Monash and elsewhere, to detect plagiarism in academic papers and student essays.

At the moment, medievalists can search databases of Latin texts for a specific word or combination of words, but it has not been possible to enter an entire body of text and identify the sources on which a text might be based. Instead of relying purely on human memory and erudition, Damocles is able to assist the scholar by rapidly surveying a vast body of text. It compares an *entire text* (the query document) to a very large corpus of documents in which similar texts might be found, locating and highlighting for the user any passages in the query document that are similar to those in any of the documents in the corpus.

The Damocles approach differs fundamentally from that used in existing text searching tools, where the user must enter one or more query terms or phrases and the system then returns passages containing those terms. In such a system the onus is on the user to hypothesize suitable search terms. Completely unsuspected similarities ('unknown unknowns' as it were) can thus be missed.

Damocles presents the scholar with an annotated version of the query document that indicates all the passages for which similar passages were found in the corpus – whether or not the existence of those similar passages was suspected. The scholar can then move on to the task for which human skills are truly needed: analyzing the significance of both the similarities and variations that emerge.

Such software can do more than just identify direct copying. It has the potential to detect and highlight significant variations when a given text has been adapted for specific ends: once similar passages have been detected and aligned, it is then possible to highlight the differences between the texts, rather than the similarities.

In the current project, we are developing a text similarity system called Factotum, specifically adapted for the detection of broader notions of similarity rather than the word-for-word copying sought by Damocles. Its design draws on recent bioinformatics techniques that align exact and/or inexact strings of DNA between samples collected from multiple subjects or species—an approach that happens to be very useful for the detection of plagiarism. Factotum will have the ability to use a lemmatizer to transform inflected word forms into bases or stems. We are also investigating adding a thesaurus, so that matches can be based on synonyms and hypernyms, as well as on exact word stems. Similarity

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[18] Damocles Software: http://damocles.infotech.monash.edu.au/damocles/about/.

will also be detected if words do not follow the order of the original text (in contrast to the strict word order used to detect plagiarism in student essays).

Besides the ability to detect the sources of the *Speculum morale* Factotum's new user interface, which we are developing, will allow us to study the relationship between pairs of documents by presenting them side by side with matching text highlighted and linked, and the ability to collapse sections at will. This allows the user not only to see which passages are similar or identical, but also to note which passages have been omitted or reordered.

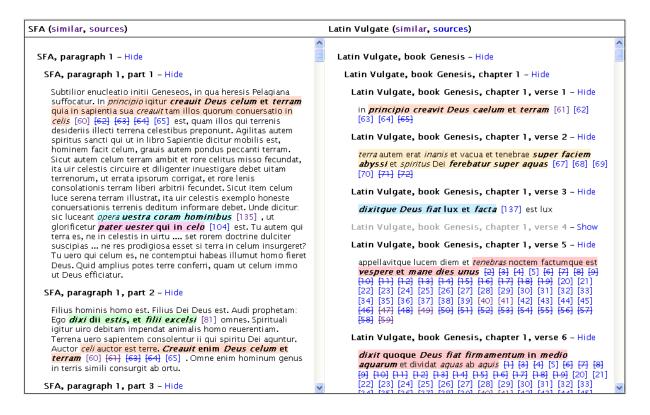**Image 1**: *Solatium fidelis anime* matches against Vulgate, View 1: detailed chunk analysis.

Examples of application

Several examples of application of Factotum are of relevance to the study of the *Speculum morale* and to medievalists in general even at this early stage of the project. One of them is identification of Biblical passages. Factotum not only identifies exact and user-defined inexact matches of text (i.e. the Vulgate) but also provides different interfaces to allow for different kinds of textual analysis. In Source view (Image 1), the studied text is divided into sections, and each section is matched with suggested source material from the Vulgate. Our first example is an extract from *Solatium fidelis anime*, a manuscript hexaemeral treatise by the English Augustinian canon Alexander Neckam (1157-1217).[19] Since the treatise is a commentary on Genesis the identification of Gen. 1:20 is a relatively easy task.

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[19] *Solatium fidelis animae* (*Tracatus moralium super Genesim qui dicitur Solatium fidelis anime*). Canterbury, Cathedral Library, Lit. B. 6, fols. 2ra-29vb (xiii[in]). An edition is being prepared by Tomas Zahora.

But in addition to that text, Factotum identified two other passages not obvious to a reader unfamiliar with the Vulgate: Rom. 8:38 and 1 Cor. 9:27 (Image 1).
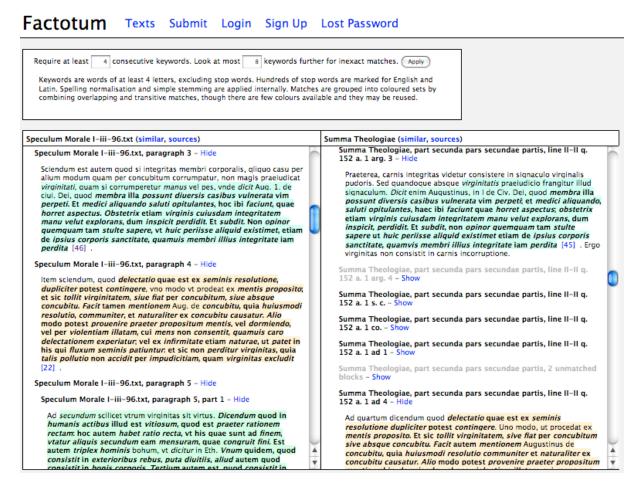
Text comparison view (Image 2) offers a complete outline of the original text in the left column against relevant passages in the source document, both in their order of appearance. Exact match control (numeric value >4) allows the user to determine the cluster size in the studied text, while the expansion control (numeric value >4) determines the size and spread of the cluster in the target text. Hyperlinks (numbers in square brackets) and colour coding allow the researcher to visually match the studied text with the Vulgate and move easily from one section to another. In our example the analysis of the text by Factotum produced a clear visual representation of the use of biblical passages in the *Solatium fidelis anime*, and pointed out, via hyperlinks, the author's repeated use of identical passages.

Image 2: *Solatium fidelis anime* matches against Vulgate, View 2: Coloured linear break-down of passages in original documents.

The third example shows the more advanced features of Factotum, and is directly relevant to the analysis of the *Speculum morale*. As a matching text, a publicly available edition of the *Summa*

Theologiae was used.[20] Besides identifying relevant passages of the *Summa*, Factotum also revealed the compiler's manipulation of Aquinas' original text in the encyclopedia, in this case the merging of a. 1. Arg. 3 and a. 1 ad 4, while omitting (grey font on the right column) and moving elsewhere (sections of the *summa* in black font between the two coloured segments) the intervening matter in quaestio 152 of 2a 2ae (Image 3).

Image 3: Matching *Speculum morale* against 2a 2ae, q. 152.

In a text like the *Speculum morale*, which is almost entirely composed of unacknowledged original texts, the content that has been included is as telling of the methods and intent of the compiler as that which has been eliminated. By collapsing and opening relevant passages, the researcher is able to view and assess the reordering of the material in an uncluttered way, allowing for different areas of focus. Thus Factotum seems not only to match Echard's prodigious memory but allows us to exceed the

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[20] http://www.corpusthomisticum.org/ .

limitations of his method, whose main aim was source identification, and produce a more textually sensitive interpretation.

Conclusions

The visual interface of Factotum, developed specifically for textual analysis with attention to historical texts promises to be of great use in the study of the *Speculum morale*, and hopefully other medieval compilations and texts in general. Because Factotum is designed to recognise both exact and inexact matching, with the addition of a thesaurus it can be adjusted to identify not only matching text in different word-order, but also paraphrase. This will give Factotum the capacity to recognise the interaction of cited, remembered, as well as reinterpreted texts.

At its present stage Factotum already provides a reliable biblical passage look-up tool with the potential of assisting editors and readers of unedited Latin texts. A demo version is available on the following website: http://webfactotum.com. It allows for the entry of a 2000 word Latin document, to be matched against the online Vulgate version. We look forward to communicating about further improvements and advances on the program.

Technical Appendix: Dmitri Nikulin

Several ideas have already been prototyped in software, implemented as a dynamic web application written in Scala 2.8 with the Lift web framework 2.1. Basic account management and text file management are supported, allowing casual users to experiment with the system using their own texts, contributing to a text archive that is used forfurther searches. Text files may be submitted in a trivial plain text format, with paragraphs inferred automatically. Texts may also be submitted in a simple XML format that allows an annotated hierarchical structure, with arbitrary levels and identifiers for blocks at all levels, to be preserved and used for presentation. For example, any given passage in a Bible text will preserve the edition, book, chapter and verse as unique hierarchical elements available to the software and the user. In cases of unusually long sections, paragraphs are again inferred automatically with simple heuristics.

In the current available demo version, the search engine performs an initial round of exact matches (with a user option to configure the minimum run length), and expands matches to near-by words that match out of order (with a user option to configure the maximum distance). Results are decorated with exact matches in bold, inexact matches grouped into light colours (transitive and overlapping matches combine groups), and italics for individual words that matched. Although synset information

is available in English, it is not currently displayed in any way in the user interface, as its raw form is barely intuitive.

Searches may be used to find related texts, generate a query/response table for all matching sections of a certain text, and also for side-by-side texts where any portion of either text may be collapsed or expanded to explore matches in context. All of these features are implemented in standard XHTML 1.1 with trivial JavaScript used for section folding and on-demand expansion. A simple Ajax stub is generated for unmatched portions of either text, which allows more context to be downloaded and re-integrated seamlessly.

Texts are reduced to an internal representation based partly on WordNet's dictionary model, with additional annotations to declare and thus filter arbitrary stop words (listed in a plain text file) and force distinct words to be considered equivalent (usable as a primitive cross-language mapping). Synonym sets are preserved and may be used to influence inexact match scoring, though this is not tested in the live demo version at present. Hypernym relations between synonym sets are preserved, though the means of their influence on match scoring is highly experimental.

The exact text search indexing mechanism adapts the excellent SA-IS suffix array construction algorithm from [G. Nong, S. Zhang and W. H. Chan, Linear Suffix Array Construction by Almost Pure Induced-Sorting, Proceedings of 19th IEEE Data Compression Conference (IEEE DCC), Mar. 2009], followed by a trivial many-to-many search between two suffix arrays representing the query texts and the archive texts.