Kodikologie und Paläographie im digitalen Zeitalter

Codicology and Palaeography in the Digital Age

herausgegeben von | edited by

Malte Rehbein, Patrick Sahle, Torsten Schaßan

unter Mitarbeit von | in collaboration with

Bernhard Assmann, Franz Fischer, Christiane Fritze

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Innovations in Analyzing Manuscript Images and Using them in Digital Scholarly Publications

Bernard J. Muir

Abstract

Evellum began developing software for the digital analysis and presentation of medieval manuscripts nearly fifteen year ago, when there were very few design and delivery options available to programmers. In the early years, it was not apparent how it would be best to deliver such products nor exactly how they would function and be used, and the question of longevity plagued us. Today there is the TEI to help standardize the mark-up of text and to offer a greater guarantee of longevity than was previously possible, and internet browsers are capable of facilitating the delivery of programmes that integrate text, image and video. Two products designed by Evellum are described here, with comments on the pedagogical issues that have helped determine their shape.

Zusammenfassung

Vor fast fünfzehn Jahren begann Evellum mit der Entwicklung von Software für die digitale Analyse und Präsentation mittelalterlicher Handschriften. Zu jener Zeit verfügten die Entwickler noch über wenige Alternativen bezüglich des Designs und der Verbreitung von Software. Damals waren die Vertriebswege für Softwareprodukte im Wissenschaftsbereich noch nicht so etabliert wie heute, Nutzeranforderungen nicht genügend erforscht und die Funktionsfähigkeit der Produkte über wechselnde Generationen von Hard- und Software nicht gesichert. Heute hilft die TEI, Text-Markup zu standardisieren und eine höhere Lebensdauer der Produkte zu garantieren. Die inzwischen allgegenwärtige Internet-Technologie erlaubt es uns, Programme auszuliefern, die Text, Bild und Video integrieren. In diesem Beitrag werden zwei der von Evellum entworfenen Produkte vorgestellt und die didaktische Fragestellung, die bei ihrer Ausgestaltung half, kommentiert.

Nearly twenty years ago I was appointed the inaugural Associate Dean for Information Technology in the Faculty of Arts at The University of Melbourne. I was then a budding medievalist who knew how to format documents on a personal computer; this made me the local IT expert and was most likely the reason why I had been appointed, though I do not think that the acronym 'IT' was used back then! Times have changed. Today I

am the Professor of Medieval Studies and for the past fifteen years have run a digital software publishing business, Evellum; as the name suggests, the business focuses on electronic vellum or parchment, that is, the interpretation and processing of ancient and medieval manuscripts for delivery in digital format. I now produce two series of digital publications, the Bodleian Digital Texts series, with Oxford University, and my own Evellum Scriptorium Series, which I produce here in Melbourne.

Younger enthusiasts may not be familiar with the Dark Ages of IT and the challenges that confronted those who wanted to somehow use multimedia in their publications and teaching materials. We decided that Apple computers were the way to go and at that time Hypercard was about all that was available to work with; but it was amazing what people were able to achieve in such a restrictive situation. A couple of years later, Oracle Media Objects (OMO) appeared on the market and had a number of more advanced features to offer than Hypercard, so we migrated. It was at this time we realized that the software was primitive and that it would obviously develop in an incrementally fast manner over the next decade, so we made an important decision, that from this point onwards we would keep the media and the program separate from each other so that our work could be moved to another platform or program relatively easily. In this way we foreshadowed the agenda behind the Text Encoding Initiative. Though there were and still are issues relating to the replacement of superseded mark-up instructions, most of these can be resolved by programming, thus reducing the amount of tedious and repetitive key-stroking.

Advances continued to be made in the IT world and at a brainstorming meeting one day a couple of years after moving to the OMO software, a voice from the back of the room said he thought that the future for all this stuff was the internet. What was that? The net was the new boy on the block and the kind of implementation that was being suggested had not even been contemplated yet. We were all still preoccupied with the novelty of electronic mail and fascinated with how it had caused the world to shrink. Afterwards, we moved to Netscape, which we used as the front end for our first CD ROM. Then came Internet Explorer, which offered more features, and so we moved to it and used it for the next two projects. As is well known, the always strained relationship between Microsoft and Apple eventually ruptured, which had the unfortunate effect of making the products we had developed using IE useless for Mac users unless they kept an out-of-date copy of IE 5.2 on their computer specifically for our products. In the event, we have redone a couple of the earlier products and they now work on two or three very popular browsers such as Firefox and Safari.

But as we all know, in recent years the Text Encoding Initiative has come to the fore and seems now to represent our best chance of producing marked-up text that will be readable for many decades to come in spite of radical changes in delivery methods. For two of our current projects we are now using XML mark-up with the Oxygen software and are able to reproduce the many features which have made our DVDs innovative and

an embodiment of cutting-edge technology in the field of manuscript studies. To date, we have produced several digital facsimile editions (see the Bibliography), two of which are the focus of the rest of this paper: "Ductus", a program for teaching the rudiments of Latin palaeography and codicology, and "The Making of a Medieval Manuscript", a documentary film which records the actual making of a manuscript in true medieval fashion from the preparation of the raw materials to the finished book.

Back in the late 80s and early 90s a number of academics, availing themselves of the desktop computer and its potential as they saw it, undertook to produce interactive programs and editions for use in teaching, and a few of these had notable success at the time. Pat Conner's (UWV) *Beowulf* Workstation, developed for a Mac, was to my mind the most successful of these, but I remember a few others such as the Thomas à Kempis *Imitatio Christi* fondly, with its tinkling waters in the courtyard and birds cheeping outside the window. Through their multi-dimensional structure and the use of sound these and a few other such works began to instil in us an awareness of what we were doing as 'multimedia' rather than just basic animation. An unforeseen problem for such academics was the rate at which development in the field would escalate, at the same time becoming more complex. Academics who tried to be a 'Renaissance man' in the Digital Age soon found that they became mired down in the technicalities, which consumed the precious time that they should have been putting into content.

Teamwork, the allocation of tasks to individuals with specialist qualifications to do just one aspect of a project, so common in science and medicine, was foreign to the average Humanities and Social Science academic. This was the second major realization that dawned upon us at an early stage, and I feel that it is what has given us the edge over our colleagues during the past decade. It has led to increased productivity, more publications, and a greater number of research grants in a highly competitive national environment. The research and development group at Evellum consists of programmers and designers, research assistants, concept developers, a project manager, and myself, overseeing the whole of each project; I write the grant applications and correspondence, negotiate contracts, and travel the world spreading the good news at conferences attended by my peers. I also write the final version of the content of each new DVD. To this team can be added a small group of artists and technicians with specialist skills who contribute to individual projects as required. Interestingly, most of these people offer their services free-of-charge—for them it is satisfying and exciting just to be part of such an enterprise.

But there is no use in producing products, no matter how good they may be, if people do not hear about them—the best teaching tool in the world lies idle and ineffective until someone uses it in a classroom or lecture theatre. We have never spent much on advertising; rather we have been patient and allowed our reputation to speak for us. Now people come to us via our website, finding us by using a search engine, perhaps the most invaluable IT tool developed in recent years. We now have momentum and

the power to influence future developments in our field, but it took over a decade to get here. Each new product developed advertises on its DVD insert both existing products and those under development, and scholars with specialist skills are now being invited to propose new titles in the Evellum Scriptorium Series; there are now plans for DVDs on 'Inside a Medieval Scriptorium', 'The Vikings and their Heritage' and 'Medieval Music'.

This past year has been interesting in that two of our research assistants have been based overseas, still contributing to our projects while completing work on their own theses; today, of course, this is commonplace, but it is another example of how IT has shrunk the world. As this discussion moves towards issues of design, functionality and didactics, it should be noted that the development of such DVDs has provided a remedy for a dire situation in timely fashion. As is well-known, small specialist subjects (sometimes referred to disparagingly as 'boutique') are today at risk in universities everywhere as they begin to experience budgetary exigencies, tightening of the belt after a decade of rapid growth as a huge influx of mostly Asian students poured vast sums of money into the coffers of Western universities. Recently this trend reversed and the good times came to an end abruptly. Manuscript studies is naturally one of the areas under the microscope where previously it enjoyed an untroubled life. Increasingly, these universities are turning to software developers such as us for solutions to their crises. Rather than employ a senior academic with specialist qualifications to teach these small classes of advance students, it is more attractive to purchase software which can be used by a less-qualified or fractional appointment to teach the subjects. Moreover, I have for a number of years taught palaeography and codicology to students all over the world who do not have access to these subjects where they are, whether in a university, a small town in the American mid-West, or the Mojave Desert (really!). At one stage I ran a postgraduate subject at the University of Calgary for a complete semester without having actually been there.

The remainder of this paper is a description—*cum*—reflection on how two projects were conceived, developed, delivered and received, the final stage being the most important both pedagogically (for users) and psychologically (for us, giving us confidence as we forge onwards). Student satisfaction is a most important consideration for us for two reasons: we obviously want the user to have had a stimulating and challenging intellectual outcome from our programs, but these days government funding is usually linked to outcomes recorded in student surveys.

Project 1: Ductus: Handwriting and Bookmaking in the Middle Ages

Ductus was originally designed to meet a perceived need, to enable people who did not have access to expert instruction, wherever they might be, to learn how to read ancient and medieval Latin handwriting during the period 100-1500 CE. At the time the idea was revolutionary in the field; today there are many websites that offer an introduction

to palaeography, but none of them seems to be as comprehensive and to have the same sort of resources available as are found on the Ductus DVD. Indeed, a cursory review of those sites and courses being taught around the world reveals that many have modelled their work on our program.

In deciding what should be on such a CD / DVD, the essential items were thought to be: 1) a set of very high resolution images; 2) detailed analyses of each script; 3) annotated transcriptions of each facsimile; 4) glossaries of various sorts (terms, types of manuscripts, library codes); 5) video clips showing how some of these scripts were written, so that students could see the actual 'ductus' of each letter (hence the title of the program); a semester-long course; various 'support documents' and forms to assist users when completing their weekly assignment; and an electronic / virtual library. This last item was ahead of its time, once again. We were proposing to scan essential articles and create a virtual library on the disk so that people working in small institutions without a specialist collection of books on manuscripts or else in remote locations would have access to requisite reference materials. No such thing had at that time been contemplated or at least implemented by publishers so they did not know how to respond to our request. They just said no, either because they were suspicious of what we wanted to do or because they had no administrative system in place to charge us (not to mention they would not have known how to calculate the fee). Stymied at first, we ultimately decided that they indeed had the right to charge us for the reproduction of an entire article, but they would have no recourse if we merely 'summarised' the papers, which is what we did. Problem solved.

At the foundation of all our work is a firm belief that in order to produce the best results you have to begin with media of the highest quality. At that time we used 70 MB scans of each manuscript; today, it is 100 MB plus, which provides us with a library of 300 dpi archival materials. To give you an idea of what the implications were for setting such high standards, let me put this into perspective. When I first began using 100 MB scans, for the *Exeter Anthology* DVD in the mid 90s, I had a quite new Mac, with upgrades: when I clicked a file to open it I could go for a coffee because it regularly took about twenty-five minutes to open one image. And I had 250 images to review. Just to ascertain that none of the scans was corrupt took a few months (bearing in mind that this kind of work is done evenings and weekends when routine academic work is finished). For one of my current projects I have 750 100 MB plus images to deal with, but this all now seems merely routine. The top folder of this project contains 80 GB of data; this is backed up on a regular basis on four different external hard drives. The scale of difference between then and now is staggering.

The master image files were then adjusted as required and from them five different-sized sets of images were generated for various uses, being from 'thumbnail' to 'huge'. One set of these was made specifically for mapping, which is perhaps the most tedious aspect of this kind of work, but it is also what gives 'life' or dynamism to our projects:

the more mapping of hotspots, the more the data can be manipulated. Approximately 7,000 hotspots had to be mapped for the Ductus DVD, many more for the Exeter DVD, which contains three times as many images. Anyone involved in the preparation of digital projects will have noticed that one of the major differences between analogue and digital publishing is that with the latter you complete the 'proofreading' stage before the disk goes to production, not afterwards in a 'proof stage'. Once you have typed in a string of data and moved on, it is unlikely that you will ever revisit it. This is because there are just too many links ever to re-check properly (it is in the nature of the beast), so our Golden Rule is as soon as you have finished typing the data for a link, it has to be carefully proofed before moving on. I issue anyone whom I have chosen to work for me with a set of Guidelines: the first dot-point says, "As soon as you blink, stop working on my projects." Sounds blunt, but it is the most important thing that they can do for me; once corrupt data is entered, you can never be certain that it will be discovered until one day after the disk has been released a user gets the fatal 'File not found' message.

On the original Ductus CD, the 14-session course is called 'Course A', which implies 'B, C...', but they are not to be found. Our original idea, and it is still valid in principle, was that as much data as possible, no matter how basic it might seem, should be entered for each facsimile and its commentary and analysis. This is because at a subsequent stage the data can be sorted and configured in different ways for different user-groups. These groups might either be at different levels, from rank amateur to expert, or have different expectation of needs—for example, someone may wish to extract all the files associated with a particular script, period or region, and configure that into a course of their own. It was originally thought that we might do that ourselves (hence the 'A'), but subsequently seemed like the obvious thing that instructors might want to do for themselves; and this has proven to be the case. But we had foreseen it, which is the point in a discussion of creating a concept for a program.

We thought it essential that there be some sort of video clips to demonstrate the 'ductus' of each letter (the order in which its constituent strokes are made), as I have already mentioned. In our first attempt at this in the mid 90s, before making video clips had become commonplace, we decided to take individual letters of a script and capture their strokes in separate files, so that an 'e' might have 3 basic strokes. These would then be played as a movie and the letter would 'write or create itself' on the screen. Obviously, if you subdivided each of these basic strokes into four partial captures, then when played back the creation of the letter would be less 'jerky' or more flowing and thus more pleasing aesthetically.

We still have those early, experimental movies, but soon afterwards the technology for capturing video and formatting and compressing it was becoming more common and easier to use, and so we moved on. Subsequently, we filmed a calligrapher writing out some different scripts in real time. The beauty of this is that the calligrapher can make errors and have a second or third go at a letter and the unwanted material falls

'on the editor's floor', to recall a dated concept. It now became apparent that our future work would truly be 'multimedia' in that we would include video and sound wherever apposite. The Exeter DVD contains a short film, music and singing, and readings of poems in Old and Modern English. Once you start thinking like this, my job began to expand and I began to think of voiceovers, background music and sets! This will be discussed further in the next section.

Figure 1. This is a capture of a video showing how a formal Gothic script was written; there are four such videos in Ductus, as can be seen from the labels below the window.

The actual function and use of the program then required consideration. The people I teach using Ductus are usually advanced in their studies and are mature students who are doing the subject in order to acquire an essential skill. This means that an 'honour system' can be used in teaching—the transcription (i.e. answer sheet) is included on the disk so that in theory a student could cheat and get a better mark, but a student who really wants to learn will not do that; they will check their work against the transcription after they have had a go at it. In any event, I do not assess them on how well they transcribed the text. What I am concerned with, and where I think the pedagogical advantage is to be had, is in the students discovering why they made an

error and then explaining that to me. This is what I base my assessment on. In any event, if an instructor does not want the students to have access to the transcripts, the software is designed so that we can bar them and make the transcripts only available by a weekly password distributed by the lecturer. Some have chosen this option because their students are younger and not yet ready for the 'honour' system used with advanced students—one has to be certain that they are acquiring their knowledge from their personal endeavours.

Version 2.0 of Ductus is to a certain extent an expansion of the original publication containing more information about a larger number of sample facsimile images, but it has some significant additions. One of these is the inclusion of more video clips about the art of bookmaking and ink preparation. We also added a library of 'Additional Images' arranged by category, containing images of book spines, ownership data relevant for discussion of origin and provenance and coats-of-arms, glossing patterns, damaged manuscripts, papyri, book covers, and diagrams relating to manuscript construction. Flash was used to provide animation and give the program an up-to-date look and feel.

User feedback, gleaned both from student surveys and emails from users around the world, have been unanimously positive and enthusiastic. In some quarters, critics have asked why we charge for our publications and do not just make them accessible to everyone free-of-charge via the internet. The simple answer to this is that what we do is significantly better and that we actually pay libraries for the rights to disseminate their images which, as I have pointed out, are of a much higher quality than what is available at no charge on the web.

Project 2: The Making of a Medieval Manuscript

The second project I would like to say something about is our documentary film, *The Making of a Medieval Manuscript*. This film was made to meet a perceived need in manuscript studies; no one had yet recorded an affordable and detailed scholarly presentation of the complete process of making a book as it would have been done in the Middle Ages and even well into the Age of Print. We chose to make a codex as it would have been done in the thirteenth century in France. I engaged the services of a bookbinder who has been in the business for many years; however, this was the first time that he had ever undertaken to make a manuscript from scratch. Parchment and boards were ordered from Britain and Germany respectively, as were a few other tools required for the job that he did not already have. He already owned the various presses that would be needed for the project.

From the beginning we were concerned that the output be a pedagogically sound tool—students would have to be able to see each step of the process and also be able to examine the internal structure of the codex after it was finished. For this reason, the finished book has cutaway panels on its spine and inside its back covers that allow the students to see the cords attaching the cover boards to the text block, the excavated

channels in the boards through which the cords travel, the manner in which the quires or gatherings are stitched to the cords, the way in which the head- and tail-bands are attached, and the ruling technique employed (two different types of ruling are demonstrated—one in lead point and the other scratched into the surface of the parchment with an awl).

The filming was done over three days using two professional cameras. This produced about 40 hours of raw film which in the end was edited down to 40 minutes, just about the right size of a 50-60 minute seminar. We decided that we would make a Powerpoint-style presentation to include on the DVD so that an instructor could take students through each stage of the process at a more generous pace either before or after showing the movie. This also offered us the opportunity to include some 'stills' that dealt with things not seen in detail in the movie. Captions were written for each of the 'slides'; we also broke the process into several stages and included 2-3 screen-fulls of introductory comments at the beginning of each of these.

I did a rough edit of the filmed materials and reduced them to about two hours worth of filming before turning that over to the professional editors. They, of course, knew nothing about what we were doing, so it was important that I give them some guidance in editing the materials lest they inadvertently removed an essential segment (whose absence I may not have noticed until too late). I next wrote a draft of the voiceover for the film before I have seen their first edit. By doing this I felt certain that I had included a description of every aspect of the process, and this would also serve as a further check that they had not left anything essential out. I timed the length of the voiceover to make sure that it was considerably shorter than the movie itself, since I did not want it to sound like I was cramming as much information into 40 minutes as I possible could. Any good teacher knows that a student or viewer can only take in so much information at a time and that they become bored when flooded with facts.

The voiceover was then fitted to each stage of the edited film; there was usually a bit of 'silence' after the voiceover had said what needed to be said at that stage but there was a need for the user to see more of the work being done. And so we introduced some specially-recorded medieval music into these periods of silence, aiming to create a more pleasant learning environment.

The proof is in the pudding. Since the DVD was released last year, hundreds of copies have been purchased by universities all around the world and many commendations have been received. This project leads to the next, which is on the workings of a medieval scriptorium. Here the user will be introduced to every skill required for actually writing out a text and decorating it by hand. There will be demonstrations of how different scripts were written, how scribes used complex abbreviation systems, how they corrected errors, how they made pens from quills, and how inks and paints were made. It will be a multimedia medieval feast. Modest sets have been made devised that recreate the atmosphere of copying out text by both candle- and natural light. And in order

to give the users a glimpse into the real world behind these recreations we have filmed some segments in the factory of the pigment maker and the workshop of our modern scribe or calligrapher.

Student reaction has also been very favourable. Most people have no idea how complex a process bookmaking was in the Middle Ages, and few ever stop to consider that each one of the millions of books produced before the Age of Print was made by hand by groups of skilled craftsmen. Few activities would have consumed more resources in the Middle Ages—warfare and cathedral-building spring to mind most readily.

Conclusion

Each of the products we are now producing is designed to allow instructors to use it in a variety of ways reflecting their needs. Careful consideration of pedagogical issues lies at the heart of each DVD and the user interface has to be user-friendly and intuitive, so that complex manuals or sets of instructions are not necessary. Casual 'mousing-over' most labels or buttons should provide the average informed computer user (familiar with internet protocols) with all the information required to explore a program and understand its structure.

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