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# CAROLINGIAN CULTURE AT REICHENAU & ST. GALL

The Plan of St. Gall (hereafter the Plan) (Stiftsbibliothek St. Gallen, *Codex Sangallensis*, MS 1092) is the earliest preserved and most extraordinary visualization of a building complex produced in the Middle Ages (Schedl 2014). Drawn and annotated on five pieces of parchment sewn together, the Plan includes the ground plans of some forty structures as well as gardens, fences, walls, a road, and an orchard (Fig. 1). Three hundred thirty three inscriptions identify the buildings and their uses, including a main church, a church for the novices and the ill, a scriptorium, lodgings for visiting monks, a monastic dormitory, refectory, kitchen, bake and brew house, guest house, abbot's residence, and an infirmary, and numerous fields and industrial out-buildings. One of the inscriptions on the Plan itself states that it was designed for Gozbert, the abbot of St. Gall (816-837 C.E.) and the person responsible for building the monastery's great Carolingian church in the 830s.

The pre-history of the digital project focused on the Plan (http://www.stgallplan.org/) began in 1998 when Bernard Frischer, then a professor at UCLA and a pioneer in digital archaeology and virtual reality modeling, suggested that it might be possible to create a virtual reality model of the Plan. Initially, we thought that it might be possible to use the elaborate architectural reconstructions of the St. Gall monastic Plan by Walter Horn and Ernest Born (http://www.stgallplan.org/en/horn_born.html/) to create a virtual reality model of the ninth-century monastery (Horn, Born 1979). At the time, I was Director of the UCLA Center for Medieval and Renaissance Studies, and together with Professor Frischer, I began to look into the possibilities of such a project and the possibilities of finding funding for it. Initially the latter proved impossible: one suggestion provided by UCLA's development office was to attempt a joint venture with a gaming company that would pay for the digital production in return for being able to use the resulting model as the environment for a computer game platform. This proved unrealistic since, at the time, as one gaming industry executive explained, their primary market was children and they saw no value added to creating a scientifically accurate reconstruction (today more realistic digital games attract a more mature and educated audience).

We thus dropped the idea for several years until the Andrew W. Mellon Foundation's Donald J. Waters, the Senior Program Officer for Scholarly Communications, expressed interest in a digital project within the scope of that division that seeks to use digital technologies to expand and equalize access to cultural and scholarly resources across sectors of society. In 2003, we received a grant from the Mellon Foundation in the amount of $24,000 to

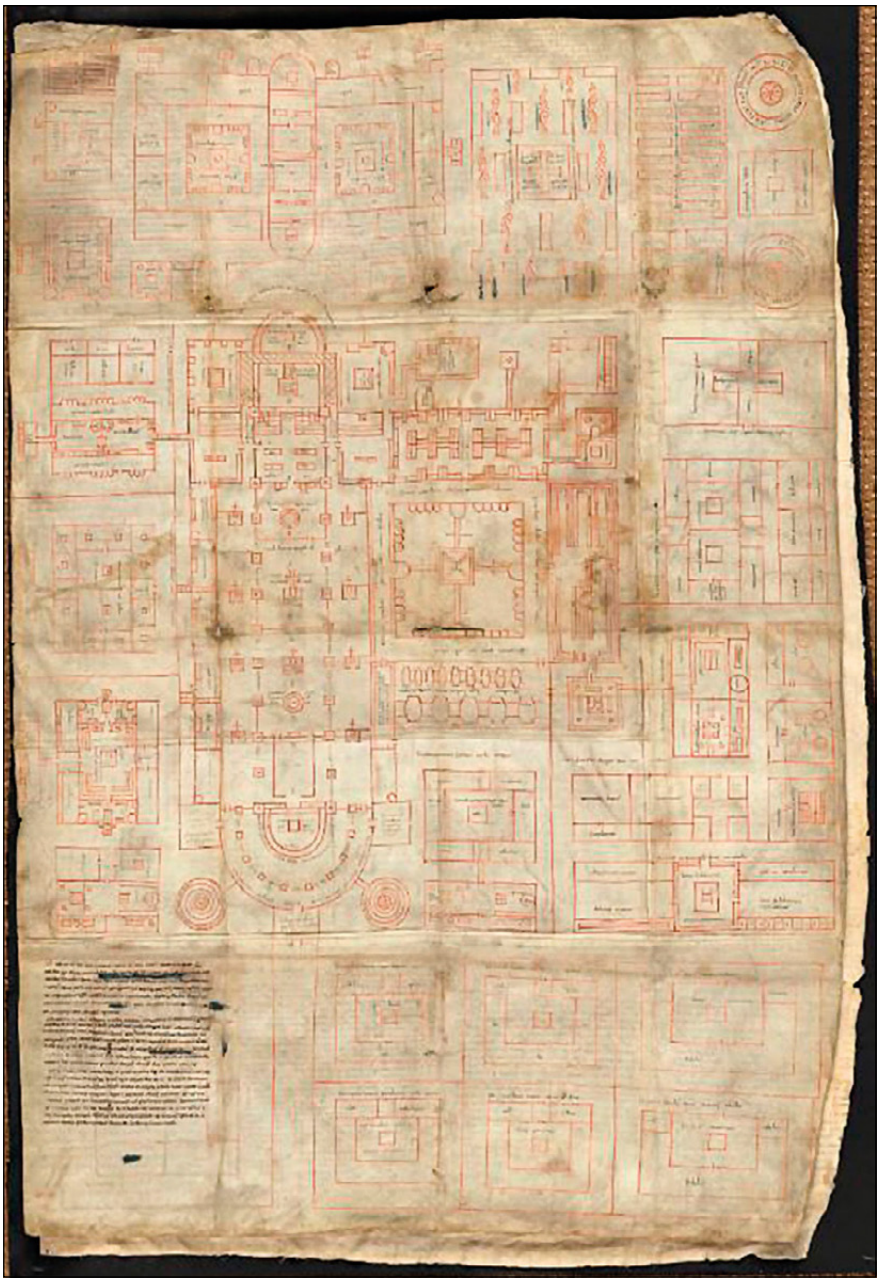

Fig. 1 – The Plan of St. Gall. Stiftsbibliothek St. Gallen, *Codex Sangallensis*, MS 1092 (reproduced with permission of the Stiftsbibliothek St. Gallen).

explore the possibility of creating a virtual reality version of the manuscript with related digital scholarly databases. With this grant, we were able to begin a serious evaluation of the potential of digital approaches to the study of the Plan and subsequently received funding for the first phase of what became the Stgallplan.org website. Hans Rutimann, a Senior Advisor at the Mellon Foundation, began to follow the project and provided invaluable advice throughout both phases.

Early on in the project, we reached a major conclusion, namely that constructing a virtual reality model of the St. Gall Plan based on the architectural renderings of Horn and Born was not only impossible but also ultimately undesirable. The Plan, we realized, is not an architectural rendering of a complex of buildings as they ever existed or perhaps were meant to exist. The Plan provides no elevations; it does not indicate materials, wall dimensions, roofing, or any structural information. Nor does the layout of the buildings correspond to a realistic geographical arrangement. The individual buildings are not placed in a real space and the layout does not correspond to the actual terrain of the river valley in which St. Gall is located, but simply placed in approximate distance one from the other in order to include as many as possible within the dimensions of space created by five parchment sheets. While the suggestions by Horn and Born of what such buildings might have looked like are an impressive feat of erudition and imagination, the latter is more powerful than the former and offers but one way of imagining the monastic complex. More importantly, we realized that the scholarly consensus concerning the Plan has largely rejected the hypothesis advanced by Horn and Born that it represented a standard model for Carolingian monasteries emanating from the imperial court that was to be carried out across the Empire. Rather it developed in stages at the monastery of Reichenau, as can be seen in the changes in the drawings themselves, and should be seen more as an imaginative reflection on what an ideal monastery might have contained than as a builder's blueprint. We thus decided that if we were to attempt to build a virtual reality model of the complex we would be participating in a deception – inviting the user to experience an imaginary building complex as through we were presenting what a monastic complex actually was in the ninth century.

One of our earliest advisors on the project, Eric Fernie, made an additional observation, one that came to guide the entire project. He observed that there were two fundamentally different types of Digital Humanities projects. The first was a project that offered a wide public the opportunity to experience a past reality virtually. Such projects could be innovative and educational, and their production might demand considerable scholarly investment. However, they were not actually tools for generating new knowledge about a topic. The second type of Digital Humanities product was one that aimed to produce

a research tool – one that would allow scholars to conduct experimental or scholarly analysis and thus generate new knowledge not otherwise available through traditional textual methodologies. If our goal was the former, that is, to create an exciting and novel experience for students and the general public, he wished us well but wanted no part in it. If, on the other hand, it were to be a genuine tool of scholarly research, then he would be interested in participating in the enterprise. Of course, as Fernie well knew, these two purposes are more poles on a continuum than diametrically opposed possibilities, but we determined early on to be sure that we were developing a set of digital tools that would advance our understanding of Carolingian monastic culture and not simply a digital environment in which to experience it.

The actual project took place in two separate phases with two objectives and two different project directors. Under the guidance and supervision of project director Dr. Barbara Schedl, we began to develop a realistic approach to the first phase of our project, which we defined as a series of interrelated models, high-resolution, manipulatable images, and databases that allow the user to study the Plan and, through it, the material culture of Carolingian monasticism. The key element was the creation of an extremely high-resolution photograph of the recto and verso of the Plan itself. We were extremely fortunate to obtain the unlimited support and assistance of the Director of the Stiftsbibliothek St. Gallen, Professor Ernst Tremp, and his assistant, Dr. Karl Schmuki. Together they gave us unprecedented access to the Plan itself for high-resolution photographs and supported the project throughout its entire history.

By the time that the project was actually under way, Professor Frischer had taken a position at the University of Virginia, and as a result this university's Institute for Advanced Technology in the Humanities (IATH: http://iath.virginia.edu/) developed the software and interface under the direction of Professor Worthy Martin.

The completed first phase was composed of the following elements.

First, we provided online access to the extremely high-resolution scans of the Plan itself, both recto and verso (Fig. 2). The size of the Plan, whose five pieces of parchment sewn in a whole has the dimensions of 112×77.5 cm, posed the challenge of presenting both an impression of the entire Plan and sufficient detail for scholarly examination of the drawing elements, the textual notations, minute markings, parchment and stitching textures (Fig. 3). We took grids of images (six rows of five each) with a digital camera and "stitched" them together into two individual images. The resulting resolution is approximately 180 pixels/cm (470 pixels/inch) over the whole manuscript, yielding an image file 1GByte for each surface. The original photography and stitching were done by Rudolf Gschwind and Lukas Rosenthaler, Imaging & Media Lab, University of Basel (http://dhlab.unibas.ch/). Of course, such an

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Codex Sangallensis 1092: Content and Context

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## The Plan of St. Gall

The Plan of St. Gall is the earliest preserved and most extraordinary visualization of a building complex produced in the Middle Ages. Drawn and annotated on five pieces of parchment sewn together, the St. Gall Plan is 112 cm x 77.5 cm and includes the ground plans of some forty structures as well as gardens, fences, walls, a road, and an orchard. Three hundred thirty three inscriptions identify the buildings and their uses, including a church, a scriptorium, lodgings for visiting monks, a monastic dormitory, refectory, kitchen, bake and brew house, guest house, abbot's residence, and an infirmary, and numerous fields and industrial out-buildings.

### Codex Sangallensis 1092

recto verso

Click on an image to get a higher resolution Zoomify (in a new window).

## Why was it made?

One of the inscriptions on the Plan itself states that it was designed for Gozbert, the abbot of St. Gall (816-837 A.D.) and the person responsible for building the monastery's great Carolingian church in the 830s. The donor, probably Haito, the abbot of Reichenau (806-823), explains that the purpose of the Plan is for Gozbert to "exercise your ingenuity and recognize my devotion", suggesting that the Plan was not a blueprint in the strict sense. Furthermore, the design does not fit the actual terrain of the river valley in which St. Gall is located, nor does the Carolingian church of St. Gall reflect the design of the church on the Plan. These facts have caused scholars to see the Plan as as a generic solution for the ideal monastery. When, why and how this ideal was developed has been the focus of Plan research during the last fifty years.

While our inability to pinpoint the Plan's author and his motivation is frustrating, the conclusion that the Plan was not created for a specific time and place paradoxically makes it more valuable: the Plan might be fairly characterized as a two-dimensional meditation on the ideal early medieval monastic community, created at a time when monasticism was one of the dominant forms of political, economic, and cultural power in Europe.

## What's on our site?

This site will provide access to the results of our long-term project of creating an extensive data base to aid research into the Plan and Carolingian monastic culture. Besides a variety of digital representations of the Plan itself, the site includes a graphic representation of how the Plan was physically made, detailed information on each of the elements of the Plan, and transcriptions and translations of its inscriptions. In addition, the site contains resources for understanding the material culture context of the Plan. A series of extensive data bases include one presenting physical objects found across Europe that add to our understanding of Carolingian monasticism, one devoted to the terminology of Carolingian material culture, descriptions of all known Carolingian religious edifices, and an extensive bibliography on both the Plan itself and Carolingian monastic culture generally. All these databases are searchable individually and collectively.

Fig. 2 – Portal to Plan images and databases.

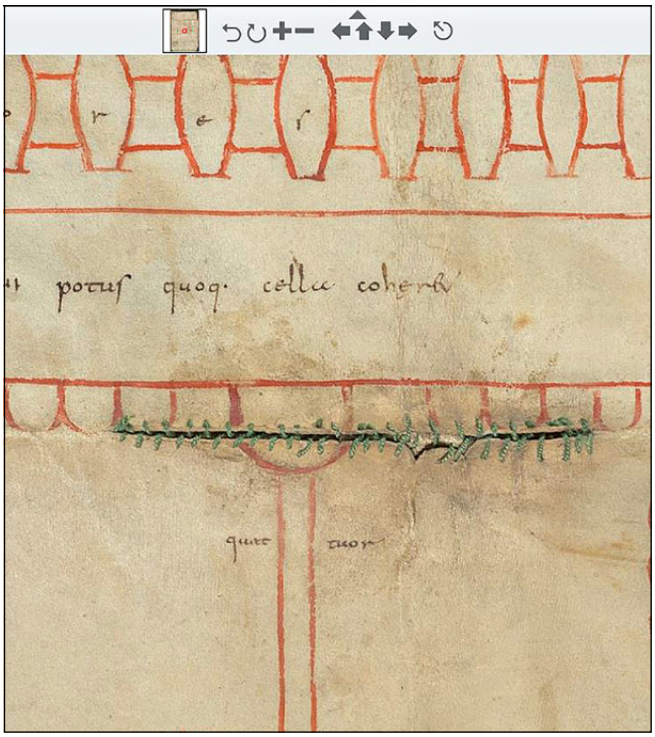



Fig. 3 – Zoomified view of Plan.

image is too large for convenient display via the web, so we used Zoomify to create numerous versions of the overall image (each at a different level of resolution) and to "tile" each level for efficient, interactive pan and zoom displays of the Plan. This technology also makes it possible to zoom into any portion of the manuscript, rotate it in any direction, and move across the entire manuscript at the same magnification, without actually downloading the entire image.

Second, we conceptualized the Plan as having 45 separate plan components, e.g., the Church, the Cloisters of the Novitiate, the Kitchen, Bake and Brew House for Guests, etc., with each having sub-components, e.g., the Nave, Cloister of the Novices, and the Cooling room for Beer, respectively, comprising over 1000 separate elements in all. For each element we provided a close-up image with the name of the element, the Plan Notation (in Latin and English) evident in the component, any Rule of St. Benedict (if any) relevant to activities transpiring in the component, and Literature reference(s) relevant to the component.

To provide access to this extensive analysis of the architectural components of the Plan, we created two interactive methods. One is a map of the Plan having pan and zoom options with each of the 45 plan components outlined by a rectangle. As the cursor moves over these rectangles, the name and notations are presented. Clicking on the rectangle for a component causes the map to zoom to the bounded area and present the rectangles for the sub-components. Again, moving the cursor over the areas displays name/notations, but in this case, clicking on the rectangle creates a new window with the specific close-up image and detailed information. The other access method is via a textual search (of Latin or English or both) of the notations recorded for the plan components which provides a search term results in a list of the plan components that contain that term with the list displaying the name, Latin notations, English translations, and a thumbnail image of the associated part of the Plan. Clicking on the thumbnail yields the new window with detailed information.

In addition to the databases specifically drawn from the Plan, we created a series of other databases that contextualize the information on the Plan and allow one to explore Carolingian monastic material culture. These include a database of objects and architectural components excavated from Carolingian era monastic sites; a database of the vocabulary of material objects taken from a wide variety of Carolingian texts; and ground plans, brief information, and bibliography on Carolingian era churches in German speaking regions of Europe.

We then created a series of search engines to explore the Plan, its components, notations, and the objects, vocabulary, and architectural databases. The first provides a drop down list of plan components, which takes one to the specific portion of the Plan. A second takes one to the specific plan notations with Latin and English (or German), which can then take the user to a detailed, zoomable image of the relevant portion of the Plan. Two other search engines allow one to search simultaneously the Plan and the material culture, architectural, and object databases. One provides a list of major terms in English or German; the other is a free-form search that can find any term in English, German, or Latin in these three databases.

The site also contains additional resources for the study of Carolingian monastic culture. These include a link to the rule of Benedict and a bibliography of primary and secondary literature on Carolingian history and culture. It also includes the Latin text of the widely circulated Commentary on the Rule of Benedict by Hildemar, a ninth century exposition of practices common to contemporary Carolingian monasticism; the complete text of Walter Horn and Ernest Born's study of the Plan, and Werner Jacobsen's *Der Klosterplan von St. Gallen und die karolingische Architektur*.

Finally, the site contains several elements to help understand the history of the manuscript itself and its preservation and analysis through the centuries. To illuminate the processes by which the Plan might have been created, we

designed an interactive HTML display to allow one to investigate a collection of hypotheses about the sequence of steps in that process. A step-by-step graphic shows how the Plan was actually constructed, beginning with a single sheet of parchment, the preliminary drawing, and moving to subsequent additions of sheets as additional components were added. Since the exact order is uncertain, the graphic allows the user to explore different scenarios of how this process might have taken place. We also provided a means to understand how the Plan was folded for storage among manuscripts at St. Gallen. We modeled the overall parchment as a surface in 3D animation system, Maya. We "textured" the surface with images of each side of the Plan, and then deformed the surface to correspond to folding actions that turned the multipart parchment into a manuscript-sized unit.

Finally, the site contains images of the 2D models of the Plan drawn since 1876 and provides manipulatable 3D images of the five attempts to create physical models of what the monastery might have looked like had it actually been constructed according to the Plan. To present those models we created Quicktime Panoramas that allow one to view interactively all visual perspectives of the extant models.

The personnel involved in this first phase at UCLA consisted in addition to the co-Principle Investigator, one full time Project Manager for three years, Dr. Barbara Schedl, and seven half-time graduate research assistantships spread over two years. These were held by Melissa Cocks, Hannah Friedman, Leanne Good, Jennifer Ng, Ned Schoolman, Erica Westhoff, and Sarah Whitten. At the University of Virginia the personnel were, along with the co-Principal Investigator, a project leader, Professor Worthy Martin, working at 75% for two years and at 40% in the third year of his IATH effort, and a support staff member who worked at 70% for the first two years and at 40% the final year. Additional expenses included hardware, software, a digital camera and camera stand for photographing the Plan, consultant fees, and travel to St. Gall. The total budget came to $1.065.215.

For the first phase of the project, various technologies were used in the development of the overall information architecture: Javascript, CSS, and Ruby-on-Rails. The technical team at the University of Virginia initially maintained that multifaceted information architecture for several years while the planning for Phase Two was carried out. As Phase Two began implementation, that team then worked closely with the new technical team at UCLA to make the transition from Phase One to Phase Two manageable and to test thoroughly the new implementation to assure successful transition.

Phase One of our project provided a tool for studying the material environment of Carolingian monasticism. During the course of a feasibility study for the second phase, funded by the Mellon Foundation in the amount of $493.000, we determined to concentrate on the intellectual and textual

Fig. 4 – Portal to Manuscript images and databases.

aspects of the Plan and of monasticism. It accomplished this by identifying and providing access to the contents of the specific manuscripts containing the texts that informed the world of those who produced the Plan, and those for which the Plan was prepared (Fig. 4). The Plan was produced at the island monastery of Reichenau, and thus we sought to include as many Reichenau manuscripts from the ninth century as possible. Since the Plan was intended for St. Gall, we likewise sought to include all extant ninth-century St. Gall manuscripts so that one could understand the intellectual milieu in which the Plan was studied and preserved. Catalogues of the library holdings of these two monasteries exist from the ninth century and many of the actual manuscripts that they list are still extant and can be identified. Approximately 95 manuscripts at the monastery of Reichenau that appear in its transmitted catalogues from the ninth century have survived into the twenty-first century. Since the suppression of the monastery, these have been scattered across Europe. Most of them are in Karlsruhe, but isolated manuscripts from the catalogue have been found across Europe and in the US. Approximately 81

extant manuscripts have been identified as those listed in the catalogues of St. Gallen. Most are still in St. Gallen, although a few are currently elsewhere in Switzerland, Europe, and the US. We determined to digitize as many of these Reichenau and St. Gall manuscripts as we could, as well as providing detailed metadata on the manuscripts themselves, their content, and literature on the codicological history of the manuscripts.

This phase of the project was conducted entirely at UCLA, with the software design being produced by the Digital Library Project at UCLA directed by Stephen Davison. Dr. Julian Hendrix was the project coordinator for this phase of the project. His responsibilities included the identification of extant manuscripts from the two institutions, obtaining permissions for their digitization when possible, coordinating the actual digitizing, the preparation of metadata for each, and the elaboration of the hypertext. In this he was initially assisted by graduate research assistants. After UCLA changed its funding requirements for graduate assistance in ways that were incompatible with the conditions specified by the Mellon Foundation, the project hired postdoctoral researchers who completed the work.

At the same time that our project was beginning, Professor Christoph Flüeler was beginning his project E-codices, a virtual manuscript library of Switzerland (http://www.e-codices.ch/en/). Since the St. Gall manuscripts were to be an important part of this project, we were able to provide funding for his team to digitize the ninth-century St. Gall manuscripts for both projects. Thomas Aigner, Director of the Diocesan Archives of St. Pölten, Austria, and director of Monasterium.net (https:/icar-us.eu/cooperation/online-portals/monasterium-net/), had developed a mobile digital platform for photographing medieval manuscripts and we were able to contract with him to digitize manuscripts from other institutions lacking their own photographic facilities. In each case, as in the Badische Landesbibliothek in Karlsruhe, we provided institutions with copies of the images, making it possible for them to put digital images of their manuscripts on their own Internet sites. We had anticipated that our contribution of these images would be acknowledged on the institutions' websites, but unfortunately, this was rarely done. Ultimately, we were able to digitize 170 manuscripts from Bamburg, Trinity College, Cambridge, Einsiedeln, Geneva, Karlsruhe, Leiden, London, Naples, Paris, Schaffhausen, St. Gallen, Zurich, Stuttgart, Vienna, Wolfenbüttel, and St. Paul im Lavanttal. Regrettably, a few institutions holding Reichenau and St. Gall manuscripts declined to allow us to include their manuscripts in the project. An additional criterion for selection of Reichenau and St. Gallen manuscripts when we had to make a choice was to digitize manuscripts held in libraries that were difficult to access or unlikely to be digitized by other large projects such as e-Codices. Thomas Aigner's mobile photography laboratory was particularly invaluable in accessing manuscripts from smaller institutions.

The core of the database consists of these manuscripts. Although some institutions required that we simply mirror the images of their manuscripts already available on their own Internet sites, for the most part the images reside at the UCLA Digital Library. Once the team had obtained the images, the UCLA Library used the Text Encoding Initiative P5 Guidelines to develop a method for encoding scholarly description and page facsimile information for each manuscript. The TEI standard uses eXtensible Markup Language (XML) to represent information in machine-readable and interoperable manner for long-term use, and in particular it has a detailed chapter related to manuscript description. The XML files for each manuscript provided structured data that was then transformed using eXtensible Stylesheet Language Transformations (XSLT) to create a web interface that presented the scholarly description and allowed for user to page through the manuscripts as well as click on any of the enumerated works in the scholarly description to skip forward to the relevant folio in the manuscript. The images and XML files are managed in a relational database (Oracle 10g) with a web application that provides an administrative interface to allow non-technical staff to upload new files, make corrections, and review data before publication. The database schema and web application were custom-developed to serve as the digital library infrastructure for the UCLA Digital Library. It was designed in 2005 and built actively during the period of 2006-2009. At present, the UCLA Library is planning to migrate content to a new digital library infrastructure, and the St. Gall Virtual Library will be one of the many projects that will be migrated during the next two years.

As in Phase One, we decided to use Zoomify as the primary interface for two reasons. The first is practical: while it allows one to see a low-resolution image of a whole folium, it also allows one to zoom to see the finest details in the manuscript. The other was in order to protect the rights of the libraries where the manuscripts are deposited. While some libraries readily make high-resolution scans of their manuscripts available, others would have required very high licensing fees to allow us to provide access to high-resolution images of whole manuscripts. With Zoomify, one may examine manuscripts in detail, but it is not possible to download whole manuscripts or even whole pages. Users who wish to have such images must contact the libraries directly.

The metadata for each manuscript (Fig. 5) consists first of a table of contents, with hyperlinks to the folio in the manuscript on which each text begins and includes incipits and explicits taken directly from the manuscripts. The contents were determined not simply by copying existing catalogue entries, some of which are out of date, lacunose, or even erroneous, but by independent verification by the team of graduate assistants and postdoctoral researchers. The metadata also include links to standard editions, translations when such exist, and bibliographies for each text. The site provides a description of the

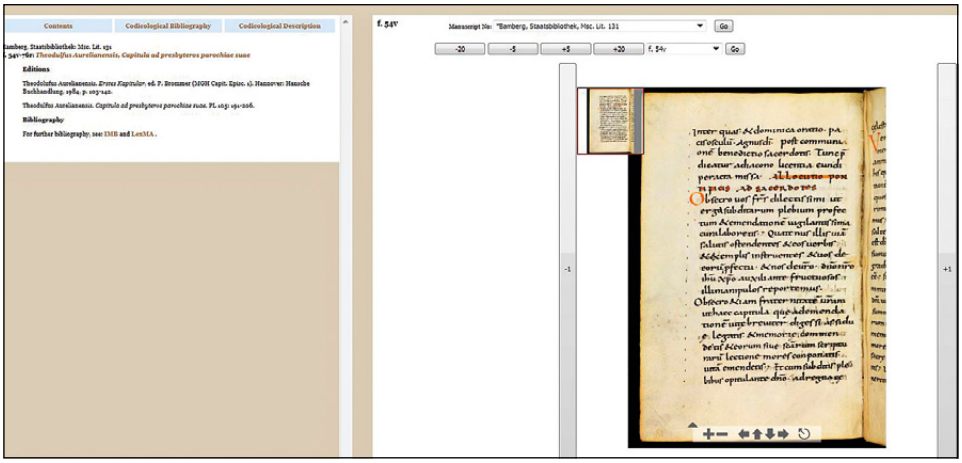



Fig. 5 – Bamberg, Staatsbibliothek, Msc. Lit. 131. Example of manuscript metadata and folio image (reproduced with permission of the Staatsbibliothek Bamberg).

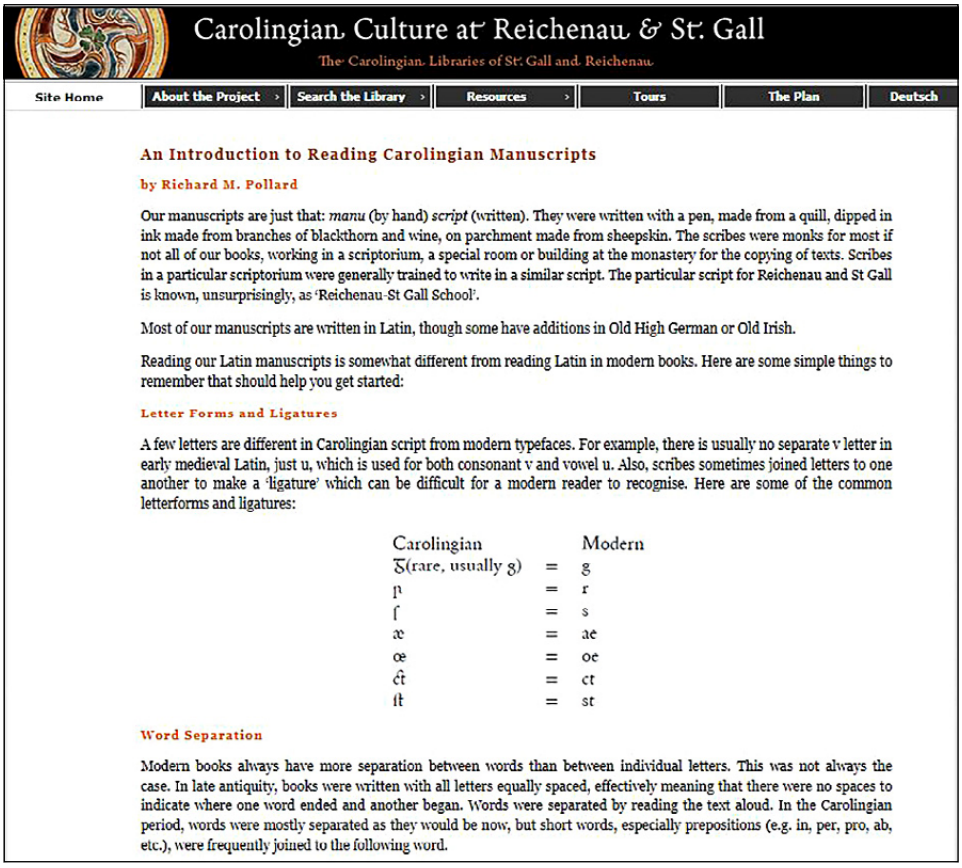
editorial conventions governing collation, titles, incipits/explicits, and index reference numbers. Originally, we had intended to provide transcriptions and translations of the text as well. We do provide links to standard edition of texts but of course these texts do not represent the specific version contained in the manuscript and thus may vary considerably from available editions.

The metadata includes a technical description of the manuscript, its material, dimensions, collation, page layout, script, hands, date, and origins, all according to the current literature. The team did not independently verify date and provenance. Finally, the metadata includes a basic codicological bibliography for each manuscript.

Markup for the metadata was created using custom XML tags created by the staff of the Digital Library designed to conform to TEI standards. The academic staff then had to master XSL, which allowed them to enter the data in such a manner that it could translate the XML for display.

A series of search engines and supplemental resources provide access to the manuscripts. It is possible to search the collection by manuscript or by key word appearing in the metadata.

In addition to the access to the manuscripts and their metadata, this phase also created a series of resources for their study (Fig. 6). These include an introduction to reading Carolingian manuscripts by Richard M. Pollard; links to related digital libraries; and a series of "Tours," specialized introductions to particular issues related to the manuscript cultures of Reichenau and St. Gall solicited and edited by Dr. Richard Pollard and written by specialists for this project. These include:



Carolingian Culture at Reichenau & St. Gall

The Carolingian Libraries of St. Gall and Reichenau

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**An Introduction to Reading Carolingian Manuscripts**

by Richard M. Pollard

Our manuscripts are just that: *manu* (by hand) *script* (written). They were written with a pen, made from a quill, dipped in ink made from branches of blackthorn and wine, on parchment made from sheepskin. The scribes were monks for most if not all of our books, working in a scriptorium, a special room or building at the monastery for the copying of texts. Scribes in a particular scriptorium were generally trained to write in a similar script. The particular script for Reichenau and St Gall is known, unsurprisingly, as 'Reichenau-St Gall School'.

Most of our manuscripts are written in Latin, though some have additions in Old High German or Old Irish.

Reading our Latin manuscripts is somewhat different from reading Latin in modern books. Here are some simple things to remember that should help you get started:

**Letter Forms and Ligatures**

A few letters are different in Carolingian script from modern typefaces. For example, there is usually no separate v letter in early medieval Latin, just u, which is used for both consonant v and vowel u. Also, scribes sometimes joined letters to one another to make a 'ligature' which can be difficult for a modern reader to recognise. Here are some of the common letterforms and ligatures:

| Carolingian | | Modern |
|---|---|---|
| ȝ (rare, usually g) | = | g |
| ꝛ | = | r |
| ſ | = | s |
| æ | = | ae |
| œ | = | oe |
| ct | = | ct |
| ſt | = | st |

**Word Separation**

Modern books always have more separation between words than between individual letters. This was not always the case. In late antiquity, books were written with all letters equally spaced, effectively meaning that there were no spaces to indicate where one word ended and another began. Words were separated by reading the text aloud. In the Carolingian period, words were mostly separated as they would be now, but short words, especially prepositions (e.g. in, per, pro, ab, etc.), were frequently joined to the following word.

Fig. 6 – Introduction to Carolingian manuscripts.

1) The Libraries and Library Catalogues of Reichenau and St. Gall by Prof. David Ganz, King's College, London.
2) Book Production and Illuminations from Reichenau and St. Gall by Prof. Adam Cohen.
3) Monastic Life at Reichenau and St. Gall by Dr. Julian Hendrix.
4) Carolingian Literature at Reichenau and St. Gall by Dr. Richard M. Pollard.
5) Classical texts at Reichenau & St. Gall by Dr. David Butterfield.
6) The Use of German in Reichenau and St. Gall manuscripts by Prof. Anna Grotans.
7) Reckoning Time at Reichenau and St. Gall: Computistics by Prof. John Contreni.
8) Law and Formularies in Reichenau & St. Gall manuscripts by Dr. Alice Rio.

A fundamental condition for funding the second phase was to develop a sustainability Plan to ensure that the project would not become obsolete or "orphaned" over time. At the request of the Mellon Foundation, we hired a consultant to look into how the project might generate sufficient income to pay a part time staff member who could maintain and correct the site as needed. None of the consultant's suggestions, such as charging for access or soliciting voluntary contributions, proved feasible. However we were able to ensure sustainability for the technical aspects of the project from the assurance of the UCLA Digital Library that it would maintain the website, make minor corrections, repair broken links, and translate the entirety to new platforms should this become necessary in the future. The Medieval Institute of the Austrian Academy of Sciences agreed to undertake future changes in the intellectual content of the site as necessary.

Professor Patrick Geary served as sole PI of the second phase, assisted by Dr. Julian Hendrix and as project manager. Graduate student research assistants Tamar Boyadjian, Kate Craig, Kristina Markman, and Natalia Rusnac undertook preliminary coding and sample manuscript analysis. Henry Chiong, Stephen Davison, Parinita Ghorpade, and Elizabeth McAulay of the UCLA Digital Library designed the software. During the actual phase, Dr. Hendrix served as project manager and manuscript specialists Drs. Richard Pollard and Joshua Westgard analyzed the manuscripts and produced metadata; the latter also edited the Tours mentioned above, and oversaw a redesign of the project website.

During the first phase an advisory committee consisting of Professors Karl Brunner, Eric Fernie, Carolyn Malone, and Werner Jacobsen, helped guide the project. During the second phase, a committee consisting of Professors Karl Brunner, David Ganz, Rosamond McKitterick, and Barbara Schedl provided direction. The budget for the feasibility study was $493.000. The total budget for Phase Two of the project including the feasibility study was $1.160.392.50. The UCLA Center for Medieval and Renaissance Studies provided the accounting, personnel monitoring, office space, and other necessary infrastructure for the project through both phases, and the project would have been impossible without the resources of this Center and its staff, particularly Karen Burgess, who administered the project, Benay Furtivo who ensured its financial soundness within UCLA, and Brett Landenberger, who contributed photography and design expertise.

Ultimately, we believe that the St. Gall project accomplished a number of objectives beyond its primary goal of providing a unique research tool for the study of the material and intellectual contexts of Carolingian monasticism. It virtually reunited manuscripts that would never have been reunited otherwise, and thereby made it possible to get a detailed impression of the intellectual environment of Reichenau/St. Gall in the ninth century. It demonstrated the

feasibility of obtaining permissions from multiple libraries as well as the existence of an audience for manuscript text and not only decorative elements. In this way, it may have inspired other, subsequent projects such as the digital recreation of the Lorsch library (http://www.bibliotheca-laureshamensis-digital.de/en/index.html). Virtual manuscripts and manuscript collections expand the potential audience for these materials, but they also enable professional scholars to navigate such familiar challenges as the difficulty of studying large manuscripts such as the Plan in detail, travel to distant libraries, the potential damage to manuscripts from repeated handling, and the challenge of comparing multiple manuscripts housed in distant depositories.

Second, it offered a possible solution to the major challenge of sustainability of such digital projects without the necessity of providing continuing funding by splitting, incorporating the hosting of the data at the UC Digital Library while entrusting the scholarly responsibility to the Austrian Academy.

Third, it resolved problems inherent in combining teams of information technologists and humanists to reach a common goal. The necessary collaboration between IT technicians and humanists to identify and solve problems together made the project at once more demanding and more satisfying. In particular, the differences in training and research methods were a routine challenge between the two groups, however rather than seeing this as a problem, it should be recognized as a positive feature of such endeavors. The need for frequent discussions and cross-disciplinary communication enriched the horizons of members of both disciplines. We discovered, for example, that we had budgeted too little for the IT and digital library support in the later stages of the project, while our budget for permissions was greater than we actually needed.

At the same time, the project uncovered challenges in standard approaches to digital texts. For example, we found an important gap in the mark-up created by the Text Encoding Initiative (TEI), which was initially designed for coding printed material with a more stable content than manuscripts. TEI does not sufficiently handle variability within different sections of the same manuscript. This problem, which caused some friction between the scholars creating the metadata and the IT specialists responsible for creating the TEI, points out the impossibility of simply taking technology designed for print culture and applying it to manuscript culture.

A more fundamental and yet unresolved challenge in collaborations such as the St. Gall project remains the conflict between the nature of collaboration in which it is difficult to parse out the contribution of a single individual on the one hand and the need for the assigning of individual credit for professional advancement. This remains a challenge that goes beyond the technical capacities of Digital Humanities and must be resolved at the level of institutions of higher education and research.

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ABSTRACT

Carolingian Culture at Reichenau and St. Gall is a digital research tool providing access to the material and intellectual cultures of Carolingian monasteries. The website was produced at the University of California, Los Angeles between 2003 and 2009 with the financial sponsorship of the Andrew W. Mellon Foundation. The first phase focuses on the Plan of St. Gall (CSG 1092) and provides high-resolution imaging of the Plan and related data bases on Carolingian material culture. The second phase reconstitutes virtually the ninth century libraries of St. Gall and of Reichenau including 170 complete manuscripts today found in 17 European libraries. For each manuscript, in addition to high-resolution access to the manuscript itself, metadata provides information on the contents, codicology, and bibliography. Finally, a series of commissioned essays introduce users to Carolingian monastic culture.