

**Electronic Journals: Then and Now...
A Fifteen Year Retrospective**

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Fifteen years ago we published an [article](#) in *Solstice: An Electronic Journal of Geography and Mathematics*, noting our respective experiences as creators and editors of two of the world's earliest electronic journals. We noted the opportunities that we thought this form of publication, using then cutting-edge technology, might provide the academic and scientific culture of the time; we projected different styles of electronic journals that might come about; and we summarized a variety of content, production, and archival issues.

Since that article was written in 1993, each author/editor has been led in different directions through the maze of disciplinary and interdisciplinary publication using electronic media. We once again pool our efforts to consider whether the observations from 15 years ago were valid or in some way reasonable, and also to share a vision based on our variety of experience.

Brief Background

A brief synopsis of the history of Zander's e-journal appears on the Web site of the *Flora Online* Archives, <http://www.mobot.org/plantscience/ResBot/FO/FloraOnline.htm>. That synopsis is reproduced here for reader convenience:

"Flora Online was established by Richard H. Zander, January 12, 1987, to address a perceived need for publication of electronically searchable

botanical text and MicroSoft Disk Operating System executable programs. It is the first electronic journal to receive an ISSN number from the Library of Congress: ISSN 0892-9106.

Between 1987 and its last appearance on Nov. 18, 1993, *Flora Online* was issued, cumulatively, on 13 5.25-inch diskettes through [U.S. Post] mail subscription, while also being offered gratis through the download capabilities of the Buffalo Museum of Science's Taxacom Bulletin Board System (1987 to 2001), a precursor in name of the popular and long-lived Taxacom listserver operated by James Beach and Peter Rauch.

Although found useful by many botanists for electronic publication of text and programs, *Flora Online* was superseded by the World Wide Web. The present archive allows free downloading of *Flora Online* publications in the form presented on the original diskettes. PKZIP is required to extract many of the programs, and MS-Dos or an emulator is required to execute them (also Ashton-Tate's dBase III or the 1990 version of Delta may be required - libraries should be asked to archive such essential programs). The text files are in ASCII.”

Arlinghaus, in June of 1990, founded [Solstice: An Electronic Journal of Geography and Mathematics](#) . That publication was originally transmitted via e-mail in typeset form using the mathematical word processor TeX (so that specialized notation could be sent) and the receiver was then either to read the Plain TeX file directly or print it out on his university's computer. She had learned

TeX on her own and then honed her skills by serving as a typesetter for a book published by the University of Chicago Press [Welford, *Useful Optics*, 1991]. Indeed, Steen [American Mathematical Monthly, Volume 99, Number 7, 1992, p. 702] noted that *Solstice* is “One of the world’s first electronic journals, in TeX,…” *Solstice* went through the transition to the Internet and has been published twice yearly, continuously (peer-reviewed and free of charge for electronic copy), since June of 1990. It is now in Volume XIX (19).

Arlinghaus and Zander, though in different academic fields and with different styles of electronic journals, came to know each other through an article written by Joe Palca in *Science* (AAAS) in 1991. It was a note about electronic journals and it mentioned the two of them as early leaders. Ivars Peterson, in *Science News*, reported his interview with Arlinghaus, following a paper she gave on Electronic Journals to the American Mathematical Society. The *Solstice* article we wrote in 1993 remains alive in e-space.

Then...

In this section we consider the points made in that earlier article with particular emphasis on those that we think remain valid. We noted that “*E-journals provide an opportunity to share computerized information with others in an orderly and responsible fashion, within the context of current technology*” and that e-journals thus offered:

1. “*An inexpensive way to share information, quickly, with a large number of individuals.*” Indeed, that fact is clearly the case; often, however, it has been a point ignored by those whose livelihood depends on charging money for the sharing of information. Here, the realm of the scholar and researcher come into conflict with the realm of the marketer and the producer of documents. The *Public Library of Science* and similar open-access journals are the hopeful exceptions.

We also noted that:

2. “*When E-journals are highly specialized, they can serve as a more formal alternative to large (archived) data banks in the natural sciences and elsewhere.*” That observation was an important one to researchers in the days prior to the Internet. Now, large data banks as well as sources for images are readily available for download from remote servers of universities (map archive from the Perry-Castaneda Library, GenBank DNA sequence library maintained by National Center for Biotechnology Information, among others), from municipal authorities, from international agencies, and elsewhere. Over time, greatly enhanced technology has transformed this observation. Many hardcopy journals place large data sets online as important supplements to articles. Today, one might note instead the importance of having readily accessible online means for the acquisition of data—through electronic journals or otherwise.

In 1993, we identified

- “*‘Genuine’ electronic journals*

- *Mere computerized versions of hardcopy titles.*
- *Non-archived electronic databases that are not really citable in a scientific paper since the data used may have been changed or may no longer be available, even though these databases may be copyrighted.”*

These distinctions appear to be general enough to fit the current e-journal scene, as well. What one might mean as “genuine” is of course open to interpretation. Nonetheless, when the first bullet point is coupled with the second bullet point (the idea of computerized versions of hardcopy) one definition emerges: a “genuine” electronic journal is one that “needs” the capability of the electronic networks in order to see or to use the full text, image, or data set. Today, we still see computerized versions of hardcopy titles. Many journals come with a disk (CD-ROM). Publishers like to see PDF files that have the “look” of the hardcopy. Both *Flora Online* and *Solstice* fall into the category of “genuine” electronic journals: *Flora Online* because it permitted the searching of databases and *Solstice* in that it offered animated maps showing spatial change over time, interactive “mapplets,” and virtual reality scenes. Although the most advanced PDF formats allow inclusion of movies and some (but not all) interactive 3-D models, examples are rarely encountered. The distinction, between the first two bullet points above, that was clear to us in 1993, remains even clearer and more important today.

The history of technological advance is replete with the use of technology to mimic previous states: thus, a car (“horseless carriage”) has a lot of “horse” power, and so forth. The history of technology, itself, therefore suggests the

appropriateness of such stepwise advance: there appear to be transitions in technology before the truly new, that based on a new model, is assimilated into the culture of the general user. People are comfortable with what they already know and are therefore often resistant to large steps of change that may undermine an existing corporate or other infrastructure.

The third bullet-point, which reflects the idea of electronic documents that might be easily changed in some way, beyond a word processor document shared and edited by a group, is a topic of much general current concern. Solutions address many levels of electronic storage, including permanent archives of hardcopy articles, like JStor, while Wikipedia, the online encyclopedia created by users, has caused much debate on this topic across a full spectrum of interested parties. These three points have continued to be important. They endure.

To consider the mechanics of electronic journal production, we separated our observations into three broad categories: “*content issues, production issues, and archival issues.*” These categories were useful for thinking about electronic journal production in 1993 and they still are today.

The content issues cited were those one would note about any journal, independent of its means of transmission or production. The caveat that is critical is to caution e-journals producers and editors not to forget that content is the most important issue. When the technology is exciting, new technological

advantages can overpower and sweep away perhaps not-so-common academic sense. [Advice Hemingway offered to new writers: "Kill your darlings."]

Production issues change more rapidly than anything. What is valid and exciting at one point in time is obsolete or intrusive in the next instant. While it is important to identify production issues, it is at least as important to understand that all users of the technology need to keep a flexible outlook--the method of production is a moving target. New means of presenting standard and expected information (a perfect replica of a hardcopy page as a PDF) are immediately acceptable and can be expected to last well. On the other hand, new means of projecting new kinds of information (e.g., embedded YouTube movies or interactive 3-D modeling), must be carefully packaged to emphasize the information over the mechanism of presentation.

Archival issues identified in 1993 endure. Archives should be available, durable, retrievable, and salvageable. While archival issues were not a matter of much concern by many early in the development of electronic journals, they have come into their own in recent years. They were, and are, a critical issue if electronic journals are to survive. There have been no archival substitutes ever offered for absolutely standard software and for periodic transfer of information to new media as the older become obsolete or degrade. Electronic journals now require a priesthood, and librarians and publishers must scramble to provide this service ahead of technological advance. Although at any one time particular rules

of thumb seem obvious, the inexorable changes that obviate past concerns and necessitate a focus on solutions to presently inconceivable problems are not projectable. One may now assert that an e-journal, to endure, should avoid WordStar, Multimate and Microsoft Word, and shun EBCDIC and ASCII, cleaving to PDF and Unicode, but one might expect at any time solid solutions to present concerns and entirely new problems. Who not in the armed forces is worried right now about rogue or war-related EMP pulses that could wipe out an e-library however widely distributed?

At the conclusion of our 1993 article, we noted that “*The advantages of electronic publication: inexpensive, fast, easy to store, easy to search, long-term archivability, easily justify the time spent learning to deal with the new technology.*” That is a conclusion that we believe is equally valid today and is one that will prevail.

Now...

Today the mechanics of electronic journals are awash in new technology. Scholars have one view of what to use; librarians may have another; editors may have yet another; and marketers may have still another. The outcome one desires may influence the mechanics of production.

In 1995, *Solstice* dropped the TeX format and converted to a Web format. The TeX files remain posted on the Web for those who are interested in seeing that early format. For others, there is printout from the TeX files. *Solstice* was a

Semi-Finalist in the Pirelli INTERNETional Award Competition, 2002 (in top 80 of over 1000 entries). Later, a single component of *Solstice* was again awarded Semi-Finalist status in the same competition (2004, top 80 of over 1400 entries). The Internet was becoming well enough established to draw a substantial number of entries for this competition from around the world.

In 2002, Arlinghaus co-authored John Wiley & Sons first e-book, which was, according to Global Mentor, “the first eBook released by a major publisher that contains extensive user interaction stored in the industry standard Open eBook format.”

The editorial staff and reviewers were extremely enthusiastic about the document. The technical staff was accustomed to using style sheets and xml and related features that permit rapid searching and use of technology standardized at the time. The animated maps, used in support of the proof of a theorem, would not fit into this format. Neither would the animated walk through Königsberg to demonstrate the famous Königsberg Bridge Problem.

There were numerous instances of lack of fit of “current” technology in use by Wiley with the materials actually submitted by the authors. All of the materials submitted worked well in the Internet/Web browser environment. However, that environment did not provide presentational niches expected by the marketing and technical departments. Wiley’s creative solution was to hire a firm (Global Mentor) to design a special “reader” that would support our various animation needs and also suit the needs of Wiley’s various departments. The eBook thus was marketed with its own reader. What had been a set of conflicting interests

among scholars, technical staff, and marketers was resolved with a little imagination. This document was a “genuine” eBook that truly needed full electronic capability: the publisher recognized this fact and took appropriate action. This eBook became a finalist in the Pirelli INTERNETional Award Competition, 2003 (in the top 20 of over 1200 entries). Technology became the handmaiden of culture.

Despite best efforts all around, and many successes of various sorts, the use of marketing of the eBook only from a Web site was not successful. Perhaps the project was too far ahead of its time. When the eBook was just recently placed, with Wiley’s permission, in The University of Michigan’s “Deep Blue” for free download, there were 59 viewings of the download page and 27 downloads in the first month, translating to a “sale” of about 1 book per day—vastly more than the sales rate for the book in a single month over the previous six years. Arlinghaus shares download data and other information with Wiley’s Steve Quigley as they continue to work together in a creative and constructive relationship to understand various aspects of this new form of publishing.

Zander has had different experiences. Recently he served as leader of an International Association for Plant Taxonomy committee investigating electronic publication of new scientific names for plants. The present Code of Nomenclature for Botany requires that any new species or genera be published in printed matter. It makes no mention of electronic publication and, no, one cannot publish a new name ONLY electronically, but valid publication must simultaneously involve hardcopy issues archived in two or more publicly accessible professional

libraries.

Some enthusiastic members of the Committee averred they would publish new names on CD-ROMs or on the Web, and validate the names by just mailing a few xeroxes to some libraries (apparent grandstanding). Zander and his colleagues did try to change the Code in suggesting a couple of different formal ways to amend the Code, but the vote at the 2005 botanical congress in Vienna turned these down.

Zander's final take on the problem was that hardcopy journals that publish new names often also have an electronic version, almost always available for distribution by authors as a PDF "reprint." Thus, the usual justification for electronic publication (making information quickly and cheaply available worldwide) was obviated. This natural progression from hardcopy to electronic versions will be, he prophesied, developed by the publishers, not by scientists.

The report on the IAPT Committee's deliberations is at

<http://www.mobot.org/plantscience/ResBot/EP/index.htm>

The more recent experiences of the authors, on independent paths, are again similar. Both experienced problems in pursuing e-publishing because of the conflicting needs of various groups. What differed was level of success in conflict resolution: an issue that is certainly NOT unique to electronic publication. The number of sources for conflict today is, however, much greater than it was 15 years ago. The reason is simple. Fifteen years ago, very few people had any

stake in the idea of e-publishing of any sort. Indeed, most had never heard of it. Today, many are beginning to recognize its importance, both in expectation of the readership and in potential commercial value. The rise of conflict is an encouraging sign of such recognition.

The gigantic increase in the availability of electronic archives is another such sign as is the need for indexing of electronic materials. Scholars sitting at their home computers now have access to the holdings of their own university libraries. The University of Michigan has embarked on a large digitization of documents in collaboration with Google.

“The University of Michigan and Google, Inc. have entered into a groundbreaking partnership to digitize the entire print collection of the University Library. The digitized collection, called MBooks, is searchable in the library catalog, [Mirlyn](#), as well as in the [Google Book Search](#). Full-text of works that are out of copyright or in the public domain are available.

The University of Michigan University Library embarked on this partnership for a number of very compelling reasons:

The project will create new ways for users to search and access Library content, opening up our library collections to our own users and to users throughout the world.

Although we have engaged in large-scale (preservation-based) conversion of parts of the Library's collection for several years, we know that only through partnerships of this sort can something of this scale be achieved

We believe that, beyond providing basic access to Library collections, this activity is critically transformative, enabling the University Library to build on and reconceive vital Library services for the new millennium.

The University Library's digital collection is constantly evolving to suit new and existing demands from library users and library services. We anticipate that MBooks will change and adjust accordingly.”

Entire collections of journals of major professional societies are available over the Internet. There are general open access directories, such as the Directory of Open Access Journals from the University of Lund in Sweden. There are specialized archives throughout the world. One example is the French collection of Geoscience e-Journals. Others, catalog the holdings of broader disciplines: MathSciNet of the American Mathematical Society is one of many cases. In publication, the “open access” movement promotes the free availability of all scientific e-publications. This is accompanied by a burgeoning list of open access journals, with new revenue paradigms, ones that charge authors a nominal fee and others that request an arm and a leg. For a description of an open access journal, Public Library of Science, see:

<http://www.plos.org/oa/index.html>

The recent rise of “stable” or “persistent” URLs, that offer the author assurance that his work will carry forward into the future, independent of server and maintenance issues, makes electronic publication particularly attractive. Journals

that do not carry this archiving capability (the “DOI” or Handle) may find that their pool of attractive manuscripts will diminish. *Solstice* is archived in “Deep Blue”:

“Deep Blue is the University of Michigan's permanent, safe, and accessible service for representing our rich intellectual community. Its primary goal is to provide access to the work that makes Michigan a leader in research, teaching, and creativity”

Generally, the world of librarians has created many new categories for specialists in various phases of digitization of library materials. This thrust into the future is a particularly exciting one although it is difficult, of course, even to speculate on what the future might hold.

There are major problems in electronic communication that continue to be commonly totally ignored. The archiving of mail messages is neglected and future histories of our period and its personalities will lack the rich correspondence that illuminates, say, histories of the 1800s. Personal Web sites may be expected to be turned off on or soon after the demise of the personal Web master, and much information will be lost, unless the institution has the vision to invest in an archiving system like DSpace or Eprints. Compared to these problems, e-journals are healthy and evolving with no looming disaster.

Students entering universities today have lived a rich virtual life by the time they reach the age of 18. They are accustomed to having full communications packages in their pockets and many teenagers use them in highly creative (but not always nice) ways. University professors are challenged to make the courses stimulating in ways they did not even have to consider a decade earlier.

Arlinghaus served, from 2003-2005 as a “faculty advisor” in Prof. Klaus-Peter Beier’s “virtual reality” course in the College of Engineering at The University of Michigan. Student projects in that course presented an impressive array of materials ([link](#) to site). More recently, she served as faculty leader to a group of students for a University of Michigan entry to the 2007 Google 3D Warehouse “Build Your Own Campus” competition (she became a Google 3D Warehouse “Featured Modeler,” with pseudonym “Archimedes,” in 2007 and most of the 3D Buildings in the default Google Earth loadset are from “Archimedes”).

When these (and other) students enter the workforce what sorts of demands will they make on the academic and business communities? Indeed, it is important to note where we have been, as it is only from the vantage point of the past that one can track the present and look toward the future.

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