In the scientific community, researchers need avenues for the reliable, peer-reviewed communication of research results. Print journals have traditionally filled this role, and scientific societies have long served as providers of efficient, cost-effective journals. Over the past two decades, some commercial publishers have pushed the boundaries of the market by annually raising subscription prices at double-digit percentages. University library budgets have not been increased at the same rate, creating tremendous price pressure in the market and forcing cancellations.

The advent of the Internet and World Wide Web made electronic delivery of scientific research results not only possible, but also preferable. The initial hope of many in the scientific community was that cyberspace would provide fast and easy mechanisms to relieve price pressure, and help to create a level playing field for smaller, not-for-profit publishers.

In the event, the technology required was expensive and in most disciplines researchers who used journals (and the libraries who subscribed to them) were anyway not ready to abandon print immediately and move into a fully electronic realm. Thus most publishers found themselves having to take on additional expenses to operate in both media. They had to continue to provide print journals, while also producing electronic versions of the same material. Many small and mid-sized non-commercial publishers have therefore been unable to find resources to take advantage of electronic distribution. These organizations have tended to be scholarly societies and other organizations that have traditionally operated as break-even, non-profit entities, whose explicit goal has been to support the dissemination of research results in their disciplines. Unlike their commercial counterparts, most of these organizations had not built any significant profit margin into their operations,
and had not amassed a rainy-day fund that could immediately help offset the cost of publishing in the online world.

At the same time, another reality of the marketplace was becoming evident. While publishers began dealing with the financial pressures of operating in the dual worlds of print and electronic journals, academic libraries were facing serious financial pressures of their own. In addition to the decades-long trend of rapidly increasing serials prices, libraries now found themselves facing the prospect of having to acquire, in many cases, both the electronic and print versions of a journal. This put more pressure on already severely strained budgets. As publishers struggled to find ways to offset the cost of electronic publishing, a pricing model that charged libraries according to some version of a formula that took into account the print cost plus an additional percentage for the electronic product became commonplace. Additionally, the electronic medium and its accompanying archival concerns placed yet further new demands on library budgets, which now needed to cover the development and implementation of storage and preservation techniques for electronic journals as well as for print ones.

Both the library community and the non-commercial publishing community clearly faced difficult situations, and had limited options for addressing them. In the absence of large increases to their budgets, libraries faced the prospect of having to cut expenses, forcing cancellation of subscriptions to many journals. Non-commercial publishers had the option of remaining strictly paper-based, which would result in the journal having limited usefulness to researchers compared with its electronic competitors. Limited usefulness would mean limited use, and since library acquisitions place a premium on usage, the risk of cancellation of a journal would increase. Of course, a publisher always had the option of either contracting with a vendor to create and host an electronic version of the journal or to try and develop the in-house expertise to do so, but many smaller, non-profit, operations simply did not have the capital to take on this new and significant on-going expenditure. A final option open to these publishers was to sell or license their content to a commercial entity, but this option was unappealing to many publishers (and libraries alike), as it has historically resulted in a rapid rise in the subscription price.

Rather than simply surrendering to the status quo, the scientific publishing community and academic libraries began responding by attempting to create alternatives. Responses have been as varied as the participants themselves (researchers, editors, publishers, and librarians) whose needs are varied, but deeply interrelated. All recognize the need for change, and numerous independent efforts to address the issues from a variety of angles are underway, including:

- Supporting not-for profit publishers (Bio-One, Project Euclid, etc.).
- Creating competition (SPARC initiatives: creating new lower-cost alternatives to high-price journals – Organic Letters, Journal of Logic Programming, Insect Science, etc.).
- Distributing peer-reviewed work for free (PubMed Central, BioMed Central, Public Library of Science).
- Developing & linking e-print archives (Open Archives Initiative, E-Scholarship, D-Space).
- Creating new community models (Columbia Earthscape, MIT CogNet).

As these initiatives have evolved, one key idea has emerged: collaboration between all players in the scholarly communications community is critical to ensure the ultimate success of any alternative publishing model.

One initiative in particular focuses on leveraging the strengths found in collaboration to forge an alternative. BioOne was conceived by a unique partnership of constituents of the scholarly communications community, and developed as an effort to mount a direct and sustainable discipline-specific response to the problems outlined above. Its goal has been to build a new, co-operative, electronic publishing venture whose operating structure and business model is technically and financially viable for both the academic publishing community and the library community. Initially, BioOne a unique partnership of constituents of the scholarly communications community
was developed as a richly linked database of high-quality journals, representing a wide cross-section of biological sciences, that could be acquired cost effectively by libraries.

BioOne's founding organizations represent broad constituencies: The American Institute of Biological Sciences, The Greater Western Library Alliance, SPARC, The University of Kansas and Allen Press. The concept and initial operating structure of BioOne was developed by a very active volunteer Board of Directors and a Working Group consisting of representatives of these organizations, which ensure collaborative development by representing library and society interests. Additionally, important strategic partnerships with organizations that held expertise in marketing and distribution of electronic services (OCLC and Amigos Library Services) were established early in BioOne's development to help foster awareness of BioOne's goals (as well as access to its contents) in the worldwide library community. A unique aspect of BioOne is that collaboration is not at committee level but rather at the business level. Its principals address the economics of publishing from three perspectives (creator, purchaser and end user), and all aspects of BioOne's operations are vetted by these groups, ensuring that consensus is reached on operational issues as diverse as content acquisition and pricing.

In order to ensure that this collaborative effort could remain independent and unbiased, it was critical that an independent entity, and not one of the founding organizations, manage the project. In 2000, BioOne was established as a non-profit corporation, with a paid staff of one. BioOne provides a unique opportunity for realistic collaboration; its participants have equal input into an opportunity to actively change the current scholarly communications process by creating a different publishing model together.

The collaborative model that BioOne developed benefits scholarly societies in a variety of ways. Specifically, it provides an inexpensive (in many cases, no cost) vehicle for non-commercial publishers to convert existing print journals to electronic form. Once a journal is online with BioOne, it is marketed and sold as part of the entire BioOne collection, which provides the opportunity for a publisher to receive additional incremental revenue, and the chance to remain financially viable and independent through new uses of content.

BioOne also provides its publishing partners with the ability quickly to reach greatly expanded audiences. With its marketing and sales partners, BioOne has established a broad and loyal subscriber base, which publishers reach immediately upon inclusion in the database. Just as importantly, publishers who participate in BioOne have the opportunity for realistic collaboration with each other as well as the libraries that have traditionally served as their main customers. This has proven particularly effective as publishers learned lessons from the library community's success in the formation and deployment of consortia. BioOne has been able to be very well informed of consortium arrangements, and has had good success in expanding participating publishers' reach by working with consortia to get access to non-traditional users such as those in two-year and community colleges.

In addition to serving non-profit publishing organizations, BioOne's business plan always takes into account its mission of equally serving two constituencies: publishers and libraries. To achieve this, it uses a pricing model based on cost recovery. This model is designed to recover costs, and thereby ensuring sustainability for publishers, by setting reasonable pricing policies tied to covering actual operating costs (rather than generating profit margins). Because BioOne is a registered non-profit entity in the United States, it is required by law to make its accounting records available to anyone who wants to access them, which helps ensure openness in reporting of expenses. The organization is specifically structured to keep operating expenses low; using outsourcing and strategic partnerships wherever possible.

Another key element in the business model that helped to ensure that publishers viewed BioOne as a true collaborative partner was the establishment of a revenue-sharing pool for publishers. Fifty per cent of every dollar of subscription income is dis-
tributed directly to participating publishers. The other 50% covers BioOne's operating expenses. The subscription revenue is allocated to participating publishing using a formula that is designed to create as level a playing field as possible for the variety of journals (large and small, specialty and generalist) included in the database. The revenue-sharing formula uses a calculation based on combination of pages contributed to the database and hits on the journals' content. An independent CPA firm audits this revenue-sharing calculation in order to verify the amounts each journal receives as a yearly royalty payment.

BioOne completed its first year of operations in Dec 2001, and in that first year had as subscribers more than 400 academic research libraries – individually or within consortia. These represented an FTE base of over 3,100,000 scholars, students, researchers and practitioners with the ability to access the database. Net sales receipts totalled $957,355, of which 50% ($478,678) was shared with the 40 titles represented in the database. The database has continued to grow steadily, and now has 55 journals, with about a dozen more currently in the production pipeline.

In order to achieve the part of its mission that is to help its participating publishers build and maintain financial sustainability, BioOne is committed to exploration of multiple revenue streams. The organization's intention is to explore ways to build a business model that is not entirely dependent on single revenue source such as institutional subscription fees. In its first years of operation, BioOne has been actively exploring site sponsorships, advertising, distribution arrangements, and spin-off products and services as potential additional sources of revenue. The initial findings are that while each of these options individually will probably provide only a small source of extra revenue, cumulatively, they have the potential to offset a growing percentage of operational expenses. The hope is that the eventual diversification of revenue streams will allow for moderation in subscription prices. This is a crucial element in the current marketplace; the sustainability of a publishing operation depends on it.

Another aspect of the BioOne business model has always been to develop BioOne into a richer resource than simply a collection of online journals. From its inception, BioOne has been committed to the use of industry-accepted technology standards. This approach has allowed BioOne to implement quickly and easily a wide variety of linking arrangements to a broad selection of related databases, from CrossRef to BIOSIS and to various NBII (National Biological Information Infrastructure) databases. As other resources are developed and identified, BioOne is committed to forging further linking arrangements. Currently, BioOne is developing plans to enhance its link resolver and to apply this linking technology to other article elements (e.g. linking from the mention of a species name directly to further information on that species in an independent database. Exploration of a taxonomic/keyword overlay for BioOne to help create subject specific subcollections on the BioOne site is also in progress, as is the addition of a suite of author and editor tools such as electronic manuscript submission and peer-review software toolkits on the website.

One final element of the BioOne model is to monitor emerging trends in the scholarly communications arena, and to respond to and collaborate with initiatives that are aiming to achieve complimentary goals. Most notably, the recent proliferation of interest in the Open Access movement has lead BioOne to investigate how best to incorporate elements of the Open Access philosophy into its business model. BioOne has committed to hosting three open-access publications on its site (marketed along with our traditional subscription-based titles to the BioOne user base, but free of subscription charge), as an experiment on the potential effects of having these two types of business models coexisting. BioOne also collaborates with PubMedCentral, working to create compatible files for publishers who request this service, and delivering them directly to that organization's database for free access. BioOne is also currently actively exploring opportunities for the funding of the conversion of back issues of journals to electronic form.
In the midst of all of this experimentation, BioOne’s goal remains unchanged: to continue to evolve a new co-operative operating and business model that works for both non-commercial publishers and for the library community.

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