

Why Publish Mathematics?

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On June 16, 1964, I had a conversation with Karl Stein (1913–2000), the renowned mathematician whose name became synonymous with holomorphically complete complex manifolds and complex spaces that have been known as Stein manifolds and Stein spaces since the 1950s. I remember the date and occasion so precisely because it occurred at a crucial moment in my professional life and at a very special place—the apartment of Friedrich and Inge Hirzebruch in Bonn during the traditional party for the participants of the famous *Arbeitsagung*. I had just decided to take a leave of absence from the University of Erlangen to explore the possibility of becoming the editor for the mathematics program at Springer Verlag. Stein had heard about it and tried to persuade me to give up that crazy idea. “Didn’t I understand the unmatched pleasure of sitting in front of a blank sheet of paper for weeks and even months until suddenly you are struck by an inspiration that will yield a breakthrough in a mathematical problem? How could I give that up?” The conversation was brief as I had already accepted the invitation from Springer, but I remember the part of my response where I explained that I could do more for mathematics by representing the profession inside a publishing company than by the small chance that I would prove a theorem that would change

mathematical history. I added that, in a few years, I hoped to prove that statement in a way that he, Karl Stein, would appreciate and acknowledge. Jumping ahead to 1969, I am very happy to report that Stein approached me with the suggestion to start a new journal that would allow young people to publish their first paper in a peer-reviewed journal without the often formidable hurdles set up by the established publications; he agreed to be the first chief editor, and *Manuscripta Mathematica* was born. I admit that I reminded him with pleasure of our earlier conversation.

This little story contains an answer to the question posed to me by the editors of this volume. At first I was worried that the question was too broad and the answer too obvious, because every human endeavor that can be communicated in words needs to be and has been published since the invention of script. For mathematics, as for many other intellectual achievements, it is vital that these achievements will be shared and archived. For me the question has a much more personal aspect that leads to an answer to the more specific question: *Why and how to publish mathematics?*

As a publisher of scientific literature, I have observed that the field where publications have above-average longevity is mathematics. Mathematicians, particularly the creative leaders in the field, will confirm the power of inspiration gained by studying classical or sometimes obscure papers that were published a long time ago. This is one reason why the archival character of publishing is so important to mathematics and why the effort to preserve published works and keep them accessible deserves attention and financial support. It goes beyond the scope of this discussion, but let me mention that the new technologies of the digital era offer such opportunities if used with care and some caution. The digitization of published material (respecting copyright restriction but also

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allowing generous inexpensive access by copyright holders) will be of tremendous benefit to the scientific community and to our ecology (for more information on this subject, see [1]).

When Karl Stein questioned me in 1964, he did not ask why anyone should publish mathematics; rather his question implied why a mathematician should be actively involved within a publishing company. I believe my response will go beyond the personal and will explain some of the important aspects that a publisher should consider when dealing with mathematical subjects.

The program of a scientific publishing company was mostly directed from the outside through scientific advisors who were hired by the publisher to develop the focus of the program and act as a bridge to the scientific community. That was entirely the case at Springer Verlag until 1964, when the main consultant for the mathematical program, Friedrich Karl Schmidt (1901-1977) in Heidelberg, resigned for health reasons. The business of publishing has been a very personal one as indicated by the fact that most publishing houses carry the names of their founders: Wiley, Springer, Teubner, McGraw-Hill, W. H. Freeman. However, these founders were not scientists or writers but businessmen with an interest in the dissemination of knowledge.

They had a keen sense and sensibility for subjects that were in need of outlets to communicate ideas and results. They turned to the leading representatives of fields of intellectual endeavor and solicited their advice. When F. K. Schmidt resigned, Springer realized that the times had changed and that it was no longer possible to find established scientists to run a publishing program “on the side”. Not only was the growing specialization and competition among scientists an obstacle to a generalist approach, the competition among publishers, the beginning globalization, and the need to integrate editorial judgment in acquiring good manuscripts with the efficient presentation of the published products (books as well as journals) to the market required a new approach. Heinz Götze and Konrad Springer, the publishers at Springer, understood this challenge and looked for a mathematician who was willing to learn about the economic and marketing side of the business. I had the privilege to be offered that position and appreciate now, with hindsight, the unique opportunity to be the bridge between two *modus operandi*. With the support from the scientific community—my mentor Reinhold Remmert in Germany and Richard Courant¹ in the U.S. opened a world of contacts—I

¹Richard Courant had been instrumental in building the mathematics program at Springer in the 1920s when he was the head of the Mathematical Institute at the University of Göttingen. He was the director of the Courant Institute for the Mathematical Sciences at New York University when I met him.

was able to represent the interests of mathematicians and create a viable program at the same time.

This experience forms the basis for my thesis that mathematicians, and scientists from other fields for that matter, should consider a career in publishing. Many have since then, and I believe the quality of scientific/technical publishing has benefited from their service.

As to the *how*, I would like to outline a few principles and explain in some detail the challenges posed by the ever-changing environment (*cultural, economic, technological*).

Within the mathematical *culture* I see two seemingly conflicting trends: on the one hand there is an undeniable move towards specialization, particularly on the level of solid but not necessarily spectacular research; on the other hand, great mathematical breakthroughs as they have occurred in the past decades are the result of the creative fusion of different areas of mathematics. The first trend is the result of the *publish or perish* climate that forces researchers to specialize in order to be able to produce an acceptable output. The second trend is based on the appreciation and understanding that the great outstanding problems require an interdisciplinary approach and the mastery of a broad range of techniques. Understanding these trends and the cultural climate is important for a publisher who wants to create material that is useful to both approaches. This is where the classic approach involving advisors who are respected leaders in the field *and* committed to the dissemination of knowledge is very important. An editor who has a broad knowledge of the science and of the rigor of scientific work is able to facilitate and benefit from the work of such advisors. He speaks their language and can evaluate variant opinions.

The *economic* model of a scientific/technical/medical (STM) publisher plays a major role in its relationship with and impact on the scientific community. The major factors are pricing and distribution. Observing the publishing landscape from the point of view of the scientific community, one is struck by the enormous difference in pricing between journals and books at the large conglomerates and at the smaller houses. A closer look reveals that prices at large publishing houses are often higher by a factor of 2 to 3. An even more detailed analysis shows that the higher pricing is directly related to smaller unit sales. The “chicken and egg” question comes to mind, and we believe that the answer lies in the economic model on which that publishing philosophy is based. Selling fewer copies at higher prices yields a higher profit margin, keeps warehousing costs down, and generally requires less marketing effort and expense; the larger house can rely on its core market—the libraries—all the while ignoring the crucial matter of expanding marginal sales. If one thinks of a publisher as an entity with an obligation to

publicize and, therefore, to maximize the distribution of the ideas contained in its publications, such a publishing strategy certainly conflicts with the latter goal. This pattern has not gone unnoticed among scientists, and a growing and quite vocal group is raising questions. Publishers, I believe, have an obligation to maximize the distribution of the works they have been entrusted to publish. It also makes business sense because the best authors will support those publishers that guarantee or at least strive for maximum unit sales and hence the widest possible dissemination of authors' intellectual work.

The *technological* environment of publishing has changed and continues to change dramatically. I will list and briefly comment on two aspects:

1. Production: In my lifetime as a publisher two major innovations affected the production process.

a) Offset printing gained wide acceptance and led to major changes. Let me only mention the introduction of "Lecture Notes" (in Mathematics) and later in many other fields in the early 1960s. The quick publication of camera-ready manuscripts was made possible by the improved and more widely used offset printing technology, and it led to a revolution in speed and pricing of publishing research monographs. The facility of the new technology carried the danger of proliferation, and it required the watchful eye of an editor to negotiate the conflicting currents of profitability, usefulness, and quality.

b) A new method of typesetting, $\text{T}_\text{E}\text{X}$, was developed, and it conquered the scientific community and soon the publishing industry by storm. This program allows authors to prepare manuscripts in a form that resembles classical typesetting and seemingly eliminates a whole step in the production process. The benefits are enormous, and, if used appropriately, $\text{T}_\text{E}\text{X}$ saves time and money to a degree that has probably not been fully studied and appreciated. However, as with offset printing, the use of $\text{T}_\text{E}\text{X}$ has encouraged a trend towards acceptance of manuscripts in a form that resembles finished products and seems to allow bypassing the editing and designing process that is essential for good book making. The uncritical analysis of the consequences of such technological innovations has led to misunderstandings that affect the valuation of the role of publishers. I will get back to this in my comments on electronic publishing.

2. Electronic publishing: I believe that we are in the infancy of this new format, but I want to offer some comments that fit into the framework of this paper (on this topic see [1] and [2]). While electronic publishing, i.e., access to the written word through electronic media, such as E-books, the World Wide Web, CDs/DVDs, etc., offers obvious advantages, in particular for journals and reference works, providing quick access at different locations and

fast search facilities, the well-designed book offers other forms of convenience that make it still the medium of choice for many. As technology advances, as-yet unknown options will narrow the gap, but I believe that two elements of good book making, (a) thorough editing for organization, content, and style, and (b) formatting and design for easy reading, will be important. Unfortunately these two aspects are often overlooked or taken for granted, and their cost is not considered in the debate about pricing and propriety of electronic access publications. I close by presenting some thoughts of mine that were quoted in a web posting by the mathematician Alf van der Poorten [3]:

However, I am much more concerned with the often-encountered misconception that the cost of books is largely a function of the bad old days, now past, when books "were rather expensive to produce and distribute." Not! At any rate, certainly not quite! A substantial portion of the cost in producing books arises from the editorial process of critical evaluation. While this is often done with invaluable help from the scientific community, it still requires substantial work from highly qualified in-house editors. Subsequently, there is developmental and copy editing, again, performed by experienced, well-educated, and well-paid specialists. That such effort is appreciated shows in the following quotes: "I am indebted to N. N. whose judicious and thoughtful editing of the manuscript greatly improved its readability" and "I would like to especially thank [the publishers] for encouraging me to write the first edition of this book, for their great skill in bringing a book to fruition and for their dedication to making their books the best they can be. In addition to finding many errors in formulas and language in the second edition, they put in many weeks of extremely long hours in the home stretch of the process." Further, books need to be designed to optimize their readability. This includes the treatment of illustrations and producing a reader-friendly layout. While I believe that everybody has the right to place books (and, for that matter, articles) on the Internet, I am concerned that the elimination of valuable filters (editorial) and value-added features (design and production) will erode the quality of available material (both for teaching and research). The argument that everybody is free to choose from the material made available is not con-

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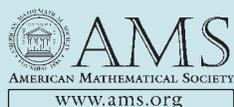


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vincing considering the many criteria going into the selection of teaching material. As a publisher, I have argued with instructors who suggested reprinting outdated editions instead of using substantially revised editions that were longer and slightly higher priced.

The role of publishers has changed over the centuries, from medieval scribes to entrepreneurial owners of printing equipment to content-driven scientific societies and marketing-savvy distributors. The word for *publisher* (*éditeur*, *Verlag*, *Uitgever*) in different languages emphasizes these different roles, and, speaking as a scientific/technical publisher, I believe that all of these functions have to be balanced to allow the publisher to be a true servant of the scientific community.

With the growing sophistication of Information Technology, this balance will change, and at this point, we are rapidly moving toward electronic forms of distribution. I would like to caution everybody involved in this discussion to keep all functions of a publisher in mind lest we destroy the publishing enterprise as a whole. The most endangered because least visible part, in my mind, is the editorial function in which publishers and the scientific community work well together to ensure the quality and usefulness of the material being published.

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- [1] WALTER KAUFMANN-BÜHLER, ALICE PETERS, and KLAUS PETERS, Mathematicians love books, in *Mathematics Tomorrow*, (Lynn Steen, ed.), Springer, New York, 1981, pp. 221-226.
- [2] JONATHAN BORWEIN, EUGÉNIO A. M. ROCHA, and JOSÉ FRANCISCO RODRIGUES, editors, *Communicating Mathematics in the Digital Era*, A K Peters, Wellesley, MA, 2008.
- [3] IMU on the Web: Communications and Information from the CEIC, <http://www.ceic.math.ca/News/IMUonWeb.shtml#CEIC19>, (February 25, 2008).