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Documenta Mathematica

A Community-Driven Scientific Journal

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Abstract:

Documenta Mathematica is an electronically produced, peer-reviewed, scientific journal, founded in 1996 by the German Mathematical Society (DMV). It is produced and distributed without any commercial publisher.

Its foundation was one of the responses of the scientific community in order to cope with the ever increasing prices of scientific journals.

Since May 1996, Documenta Mathematica is freely available on the Internet, and printed versions of its annual volumes are available at low cost.

In this article we describe its management and its 'business model'.

1 Documenta Mathematica, a Free Scientific Journal

Documenta Mathematica [1] was founded in 1996 by the German Mathematical Society (Deutsche Mathematiker-Vereinigung, DMV). It is peer reviewed and edited by an international editorial board.

It is electronically produced and offers its articles in various formats such as dvi, postscript, and pdf free of charge on the Internet. Its main servers are located in Bielefeld, Germany (<http://www.mathematik.uni-bielefeld.de/documenta/>) and at Urbana, Illinois, USA (<http://www.math.uiuc.edu/documenta/>).

Moreover, it is distributed on the 42 servers of the European Mathematical Society (EMIS), <http://www.emis.de/>, which are distributed over all continents.

The journal articles are collected in annual volumes, which, at the end of a year, are printed and sold as such at low cost (ca. 10 cents/page). The journal is archived electronically and in print at many university libraries worldwide. In particular, each of the above-mentioned servers carries the full file collection of Documenta Mathematica.

2 Journal Management

Documenta Mathematica is open to all mathematical fields. Authors send their manuscripts as TeX files by email to one of the editors, presumably to somebody working close to their field of interest. The editor organizes, again by email, the peer review process for the manuscript, taking care that it will be finished within a reasonable amount of time.

Immediately after its acceptance, the formatted manuscript is transferred to the author for final proofreading. As soon as Documenta Mathematica has obtained the author's permission, the article is published on the Internet and later in the printed annual volume.

The articles can easily and quickly be formatted into a uniform style by using the TeX style files developed by the Technical Managing Editor of Documenta. They are offered in the Documenta server for each of the four TeX dialects: Plain TeX, AMS-TeX, LaTeX2.09 and LaTeX2e and have to be prepended to the articles in order to give them the uniform layout required by Documenta Mathematica.

The Documenta style files have been designed to meet the following properties:

- They are small, hence easily handled.
- They are not restrictive, that is, they permit authors to use their own macro collections. This implies that they can easily and almost automatically be prepended to any TeX file, for example by an interactive web form.
- They are prepared for automatic handling in order to format the layout, to transform the manuscripts into the distributed versions (dvi, postscript, etc.), and to update or complete the annual volumes including their tables of contents and author indexes, if desired.

Documenta Mathematica is electronically produced, starting from email article submission and ending with the digital printing of the annual volumes. Therefore, not only is the time period between submission and publication of articles considerably shorter than for many other journals, but also the work to be done by the editors is significantly less. There is a permanent electronic editorial conference: the editors always have confidential Internet access to the list of articles under peer review and can discuss and comment on them. The editorial status of the articles (e.g. 'submitted on...', 'to be revised', 'accepted', ...) is permanently recorded here. All correspondence concerning the publication process including article reviewing is done by email. It is easy to maintain scientific quality, because, for each article, expert referees can be chosen from anywhere in the world, according to their expertise and the field of the subject of the article, and contacted without delay.

Quality control for Documenta Mathematica is very strict: an article is rejected if, after the refereeing process, one of the editors still has doubts about its scientific quality.

After acceptance, the author provides the final form of the article on the basis of the anonymous peer review reports and the recommendations of the editors.

The author also signs a copyright agreement, which leaves the copyright with the author and just passes the right of distribution to Documenta Mathematica.

The technical work for the production of the Internet publication is automated by a professional software package. For example, for a TeX file of a manuscript to be published, a single computer command does the following:

- Produces the abstract of the article as an html file.
- Updates the tables of contents (html, dvi, postscript, pdf formats).
- Produces the derived formats of the manuscript (dvi, postscript, pdf).
- Updates the total volume file.

Another command will then publish the new and updated files on the servers at Bielefeld and Urbana; it is then already published with final page numbers, ready for readers and citation.

The annual volumes are printed by a "Publishing on Demand" company and are available at a low price. Order forms (ps, ascii) are available on the Documenta server.

3 Costs and Savings

What are the costs for the production of Documenta Mathematica?

Authors, editors and referees typically work unpaid, which is the same for practically all journals in mathematics, even when produced commercially. Moreover, it is even true that, for most commercial publishers, the authors have to provide perfectly formatted, typeset TeX documents!

The additional costs have been computed in the management report of the Documenta Managing Editors to the 'Präsidium' of the German Mathematical Society in 1999 [2].

They were already marginal at that time and are even much lower today.

So, to give an idea, let us quote just from Ref. [2]:

Since a scientist typically has a personal computer, no extra equipment is needed to produce and maintain the journal. The share of the computer usage for Documenta Mathematica is ca. 2 per cent. This percentage applied to the costs for depreciation, power, and storage of the PC, assuming a lifetime of four years for the PC, amounted to 21 euro per year; the networking share for the distribution had been determined as 120 euro per year. According to what was said above, editorial and maintenance costs are marginal, so a total annual cost of ca. 200 euro was assumed. Here is a table of the actual costs in 1999:

Actual costs (1999)	
Depreciation, power, storage, share of 2%	21 euro
Network costs	120 euro
Costs of edition	marginal
Technical maintenance costs	marginal
Total	ca. 200 euro

But, what are the savings to the scientific community?

Documenta produces, for the time being, 700 pages a year, at an average cost of 0.10 euro per page. The average price (taken over 276 journals [3]) for math journals is 0.56 euro/page.

Hence the savings per page are $0.56 - 0.10 = 0.46$ euro and therefore for, say, 400 university libraries worldwide (actually, Documenta Mathematica has readers at more universities than this!), the following could be assumed:

Savings per year	
Documenta produces 700 pages a year, each for:	0.10 euro
Average price (over 276 journals) for one page:	0.56 euro
Savings for:	euro/year
400 university libraries (World): $400 \times 700 \times 0.46 =$	128 800 euro

This assumes that all these 400 libraries were buying the print version of Documenta Mathematica, which is not (yet) the case. Since the electronic access is free, the actual savings per year for the scientific community is therefore even higher!

4 A Production Example

Documenta Mathematica has never been sponsored, neither by the German Mathematical Society, nor by some funding agency, nor indirectly by, say hiring students or other people to help format the manuscripts etc.

On the contrary, the money flew the other way around.

In 1998, the International Congress of Mathematicians (ICM'98) was organized by the German Mathematical Society. This congress takes place every four years at different places around the world and is "the" event for all mathematicians worldwide, bringing them together from many countries.

The electronic production capabilities of Documenta Mathematica were used to produce the proceedings of the ICM'98 as extra volumes, a three volume edition containing 2400 pages. This production process is documented in detail in Ref. [\[4\]](#) and summarized below:

The savings or earnings from this production are given by this table:

Offer by Congress Organizers for production up to:	25 000 euro
<i>Actually used for production:</i>	1 250 euro
Transferred back to the Organizers (DMV) from sales:	6 500 euro
Savings/Earnings:	30 250 euro

These savings, or earnings, were used to contribute to the foundation of a new science prize (the "Carl Friedrich Gauß Prize" [5]), which will be awarded during every future International Mathematical Congress for outstanding research in the area of applications of mathematics.

Certainly this is a much better use of earnings from scientific publications than just letting it go to commercial science publishers.

Bibliography

[1] Documenta Mathematica

<http://www.mathematik.uni-bielefeld.de/documenta>

[2] Documenta Mathematica, Official Report of the Managing Editors, 1999

<http://www.mathematik.uni-bielefeld.de/~rehmann/bericht-eng.html>

[3] Math Journal Prices, Comparison

http://www.mathematik.uni-bielefeld.de/~rehmann/BIB/AMS/Price_per_Page.html

[4] Efficient Production of Mathematical Literature

A report given on the Workshop The Future of Mathematical Communication: 1999, Berkeley, Dec. 3, 1999.

<http://www.mathematik.uni-bielefeld.de/~rehmann/EP/report.fmc99.pdf>

[5] Carl Friedrich Gauß Prize

<http://www.mathematik.uni-bielefeld.de/dmv/Gauss/>

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