

PlanetMath SWOT: Strengths, Weaknesses, Opportunities, and Threats

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March 6, 2010

I. Strengths

Community and visibility I've estimated that PlanetMath users have contributed up to \$0.75mil of writing.¹ During that same time frame, PlanetMath's board members and major monetary donors have contributed about \$0.25mil towards operational overhead.

In the same period, from 2005 to 2009, we've recieved an estimated 30 million hits. If each hit was valued at \$0.50 (an arbitrary figure, chosen to match the value of one Point in the estimates given above), then we've delivered \$15 million worth of mathematical content, at a cost of about \$1 million.

Apart from this back-of-the-envelope stuff, we're quite popular: currently the #2 hit on google for "math encyclopedia" and #5 hit on google for "mathematics encyclopedia". We show up on the first page of search results for "math".

Math-specific software PlanetMath works well with \LaTeX source code and has state-of-the-art math-on-the-web rendering, making it an attractive option for mathematicians.

Content and coverage We currently have 8786 entries dealing with 15342 concepts. While we don't have "the most

mathematics content on the web", without doubt, the content we have is an asset. For comparison's sake, there are approximately 23488 mathematics articles on Wikipedia² and Springer claims to deal with more than 50000 concepts in their online encyclopedia of mathematics.³ Still, PlanetMath tends to have a reputation for providing in-depth treatment of topics that others may deal with more superficially. (It would be nice to back this up with some solid evidence!)

Free/Open Anyone can contribute to the project, and anyone can use the things the project produces.

II. Weaknesses

No command-line or email-based access It may seem like a minor point, but for people who are familiar with mainstream open source software development patterns, the restriction to a web interface is a big annoyance. Lack of email integration in the forums leaves us lightyears behind platforms like Google Groups or Posterous in terms of usability and features.

No access to the actual data PlanetMath's databases are not public. There are presumably many ways that the interested public could add value to PlanetMath's data, if this data was available.

¹That estimate was made about a year ago; the same instrument today suggests that our total value has *depreciated* over the past year, to something more like \$0.6mil. See <http://metameso.org/~joe/docs/transparency.pdf> for details.

²<http://en.wikipedia.org/wiki/Portal:Mathematics>

³<http://eom.springer.de/>

Even though we provide tarballs of content, our lack of procedural openness compromises our extensibility and even our legitimacy as an “open” project.

No objective standards for quality Although a tool for rating articles was developed and deployed on the production server, there is no easy way to poll PlanetMath to find out more objectively useful things like “how many theorems are illustrated with examples” or other simple structured queries. This is a sign that our data model may not be sufficiently rich. (And, if these questions are possible to ask in the backend, the methods have not been exposed to the public.)

No strategy for growth and adaptation, no public development agenda Despite the time-consuming and in some cases expensive development of various strategic plans, PlanetMath currently does not have a public roadmap or even, I’d argue, any clearly stated and agreed-upon goals. We do have a Mission Statement, but that’s different.⁴ It seems our development agenda is so poorly maintained as to be non-existent.⁵

No protocol for review and update of site policies At a high, but still pragmatic level: we don’t have any protocols for changing basic things about the site (e.g. things like the way it looks, the way it is divided into sections, the scoring mechanism). Our policies such as they are are currently managed in an *ad hoc* fashion in the community-moderated Site Documents⁶, and on the PlanetMath-hosted AsteroidMeta Wiki⁷.

Slow-to-no transition from idea to implementation There have been about a million ideas developed over the years, and contributed to the project via IRC, in

the forums, on the wiki, and at our rare in-person meetings – but many of these ideas are now languishing. Various other related projects (e.g. SAGE), both large and small, have successfully used ticket systems and so forth to sync requests to development. (Note: this critique of PlanetMath’s workflow covers nonprofit management, code development *and* math content development.)

Money-poor When critical comments about development come up, we remind ourselves that PlanetMath is almost ridiculously poor in terms of financial resources. Many of the people involved with running the project are also quite short on time these days (and as we know, time is money).

Weak connections with related projects We’re not very well connected to other math or software projects. Since we have nowhere near the amount of contributor/developer effort as e.g. SAGE⁸ or Elgg⁹ (or Wikipedia or ArXiv for that matter), it would appear that by being idiosyncratic, we may be losing out on potential synergies. Alternatively, we may just have to be even more tenacious in our efforts to collaborate (e.g. to combine with other established methods for peer review).

“Why?” Despite the site’s popularity, we have yet to learn just *why* people contribute to PlanetMath, or what they are using it for. If we could understand what people (or institutions) are getting out of PlanetMath (as contributors or users) – and what they would *like* to get out of PlanetMath – we could serve presumably serve them better. For example, we can say *we’re here to revolutionize education in Science, Technology, Engineering, and Mathematics* – but for that to work, well, we need to get it working.

⁴<http://aux.planetmath.org/doc/mission.html>

⁵<http://code.google.com/p/noosphere/wiki/RoadMap>

⁶<http://planetmath.org/?op=sitedoc>

⁷<http://wiki.planetmath.org/>

⁸<http://www.sagemath.org/>

⁹<http://elgg.org/>

III. Opportunities

We can be a leader in online math education and research support Despite the long list of problems enunciated above, one else seems to be doing any better than PlanetMath at providing an *integrated* online mathematics help tool. I think we can still position ourselves at the head of the online math pack – if we choose to, and are careful about how we do it. We'll have to do something no one else does, and at the same time, we'll want to work well with everyone else too. We can't just be a "portal" (other sites already do that), but I think it is pretty clear that we can't just be an "encyclopedia" either. If our idiosyncratic math-specific software is one of our biggest strengths, we have to find ways to make it work for us. I think this will require us to fix at least 50% of the problems listed in the previous section.

We can tap our existing friends and partners Although we have weak links to some of the important players, we do have some important existing partnerships (e.g. BKN, Springer) and some potential connections (e.g. Design Science, KMi), as well as a few well-placed friends (e.g. Jimmy Wales, Jim Pitman). Assuming we're capable of designing a "PlanetMath" that really works – what do we then say to our pals to make it work better?

Lots of content and tools available Not only is there all the stuff on Wikipedia (which we could copy and edit, or even, presumably, snarf up from a feed), there are tons of other free math and math-science learning resources that use the exact same Creative Commons license we use. And there are constructive ways to link to resources that don't use this license (and maybe even generate a bit of cash flow in the process – our "Permanent Online Mathematics Pavillion" idea). If PlanetMath is set up in a more extensible way, we'll be able to use lots of other software *tools* as well. I think that extensibility is going to be key – e.g. so that we can fi-

nally build PlanetComputing and start attracting some volunteer developers to the site.

IV. Threats

Stasis/Bitrot/Fog "Threats" are supposed to come from outside – but the biggest threat to PlanetMath seems to be stasis. In fact, the site continues roughly as it has done for years – but as Footnote 1 indicates, that's not going to be enough to preserve our value, much less grow and do more interesting things. In fact, our software tools are apparently being completely renovated by James, but the status of this project is, at present, something of a mystery. Without effective connections *to* the outside, we will be forgotten, overshadowed, and ignored. What's worse – our great ideas *still* won't be implemented.

Newsflash: We are the threat In a previous conversation with one professional society about partnership possibilities, what we heard back was that they were concerned that our publication model was a threat to theirs. Well, duh! But the question shouldn't be whose publication model will beat whose – the question is how to do the most good for mathematics. We're only a "threat" to the standard publication model if we *produce content that's better, cheaper, and/or more accessible than the things others are producing*. That's the best way forward for us to help mathematics, too. On the other hand, if we just produce a bunch of crappy content, we're not doing anyone any good. On that note, I think this following quote shows the way forward:

The rapid growth of math resources on the web, which is further pushed by wiki-based communities, is both a threat and an opportunity for intelligent math learning environments like ActiveMath. On the one hand, the continuing development of

wiki content will soon dwarf ActiveMath's carefully authored semantic-rich content; and this will make its intelligent learning services that exploit such limited but high-quality content less enticing to use. On the other hand, math learning environments like ours could potentially profit from the availability of math resources on the web. If such content were to be enriched with machine-readable annotations that describe it, and if we could harness the collaborative authoring process and encourage and guide wiki authors to continually provide content and metadata, then intelligent services could unleash their true potential, with immediate return and added value for authors and learners. – Claus Zinn *Bootstrapping a Semantic Wiki Application for Learning Mathematics*