

Title: Blogs, Wikis, MathML: Scientific Communication

Date: Sep 08, 2008 02:00 PM

URL: <http://pirsa.org/08090027>

Abstract: In the 1990s, the eprint arXivs fundamentally reshaped scientific communication in Math and Physics. In this decade, blogs, wikis and other, similar, tools are mediating an equally profound reshaping of scientific communication. I will talk about my own experience, as a blogger, software designer, and physicist, pointing to some of the successes and some of the challenges ahead.

Blogs, Wikis, MathML

scientific communication in a new century

Jacques Distler

University of Texas at Austin

Electronic Distribution of Manuscripts

Founded in 1991 (email-based). Web interface ~ 1994



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- High Energy Physics - Lattice ([hep-lat new](#), [recent](#), [abs](#), [find](#))
- High Energy Physics - Phenomenology ([hep-ph new](#), [recent](#), [abs](#), [find](#))

Revolutionary

Overcoming limitations of paper preprints (expensive and limited distribution)

Open Access (unlike the Journals)

Easy to use (retrieval of any paper from any internet-connected computer)

Fast (< 24 hours between submission and worldwide availability of a manuscript)

- Unrefereed

- Did not change the "quantity" of scientific communication

Revolutionary

- Replaced distribution of paper preprints (expensive and limited distribution)

→ Not unlike the journals

- Easy to use (retrieval of any paper from any internet-connected computer)

→ Fast (< 24 hours between submission and worldwide availability of a manuscript)

→ BUT

→ Unrefereed

→ Did not change the "quantity" of scientific communication

Revolutionary

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- Unrefereed
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Fast! < 24 hours between submission and worldwide availability of a new preprint.

Easy to use

Unfiltered

Did not change the "quantum" of scientific communication

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Unfulfilled

Did not change the "quantity" of scientific communication

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- But ...
 - Unrefereed

■ Did not change the "quantum" of scientific communication

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- Fast (< 24 hours between submission and worldwide availability of a manuscript)
- But ...
 - Unrefereed
 - Did not change the "quantum" of scientific communication

A "Commentary Layer"

• provide additional, corrections, commentary on papers or the archive (commentary of a self-unrelated nature)

• provide for communications ill-suited to the format of a scientific paper

- "A Comment on..."
- "A Response to..."
- "An Overview of..." (cf. Living Reviews)
- Back-and-forth discussions
- etc...

A “Commentary Layer”

- Provide feedback, corrections, commentary on papers on the arXivs (compensate for their unrefereed nature).
- A vehicle for communications ill-suited to the format of a scientific paper:

• An Comment on ...

• A Response to ...

• An Overview of ... (cf. Living Reviews)

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A “Commentary Layer”

- Provide feedback, corrections, commentary on papers on the arXivs (compensate for their unrefereed nature).
- A vehicle for communications ill-suited to the format of a scientific paper:
 - “A Comment on ...”
 - “A Response to”

• An Overview of arXiv’s Living Reviews

• Back-and-forth discussions

• And...

A “Commentary Layer”

- Provide feedback, corrections, commentary on papers on the arXivs (compensate for their unrefereed nature).
- A vehicle for communications ill-suited to the format of a scientific paper:
 - “A Comment on ...”
 - “A Response to ...”
 - “An Overview of ...” (c.f. [Living Reviews](#))
 - **Back-and-forth discussions**

Most Efforts Foundered

- Hand-maintaining a large web site painful
- Existing CMS tools too difficult
- Poor (to nonexistent) support for math

One notable exception:

[John Baez's Stuff](#) [Fun Stuff](#) [Physics FAQ](#) [Relativity On The Web](#) [Nasty Stuff](#) [Quantum Gravity Seminar](#) [Serious Stuff](#)

This Week's Finds in Mathematical Physics

John Baez

This is my column on mathematical physics. It appears on [sci.physics.research](#), [sci.math.research](#), [sci.physics](#), and [here](#) has pretty pictures and other nice features:

[The latest edition](#)

[All the old issues](#)

[Table of contents](#)

21st Century Technology

A new class of easy-to-use CMS ("blog") software

Easy to maintain large, frequently-updated site, with user comments, etc

Math still a problem.

MathML?

6 years ago, I decided to try ...



Musings

Thoughts on Science, Computing, and Life on Earth.

November 16, 2006

SEGAL ON QFT

I spent a delightful afternoon, yesterday, discussing quantum field theory, the renormalization group, and such matters with Graeme Segal. Earlier, he gave a nice talk in the Geometry and String Theory seminar on his approach to QFT.



[Continue reading "Segal on QFT" ...](#)

Posted by distler at 4:37 PM | [Permalink](#) | [Followups \(6\)](#)

November 11, 2006

Austin Weather



Today
Sunny
High: 74°F
PoP: 0%



Tonight
Clear
Low: 42°F
PoP: 0%



Tomorrow
Sunny
High: 67°F
PoP: 0%

Currently: Fair, 6
([Doppler R](#))

MathM



Posts with this logo see the equation in Mozilla (with the

IE/Win users can download a The posts were authored in iWebTeX) using the itexToMM

XHTML + MathML + (the odd bit of) SVG

Chiral Symmetry Breaking | Musings - SeaMonkey {Build ID: 2006111906}

Back Forward Reload Stop

http://golem.ph.utexas.edu/~distler/blog/archives/000887.html

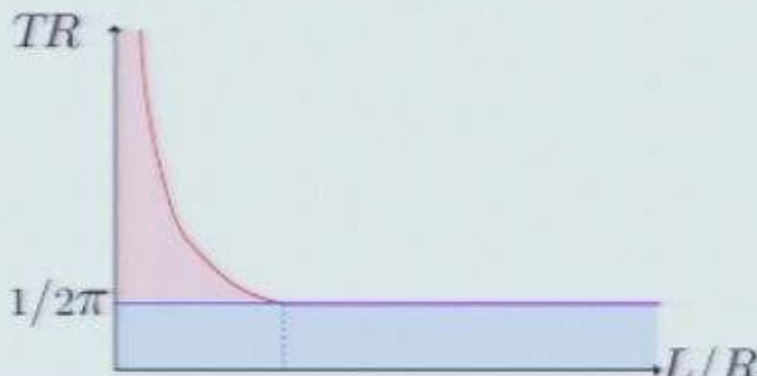
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solutions. The result is that the transition temperature is $T_\chi = 0.154/L$. This, of course, holds so long as $T_\chi > T_d$.

$$T_d = \frac{1}{2\pi R}$$

$$T_\chi = \begin{cases} 0.154/L & T_\chi > T_d \text{ (or, equivalently, } L/R < 0.97) \\ T_d & \text{otherwise} \end{cases}$$



So the phase diagram found by Aharony et al looks like the **figure** at left. All of the phase transitions are first order. In the pale blue region below $TR = 1/2\pi$, the theory confines and chiral symmetry is broken. In the pink region, the theory is deconfined but, nonetheless, chiral symmetry is broken. Above all the lines, chiral symmetry is unbroken and the theory is deconfined.

Under the Hood

MovableType

Was proprietary (but "source available."). Now GPL.

plugin architecture; plugins freely distributable.

At the time (and still) best available architecture for the purpose

itex2MML

Stream filter (original by Paul Gartside) and MovableType text filter plugin to convert TeX markup to inline MathML

MathML

An XML dialect *designed* for putting math on the Web.

It's text, not pictures

- Searchable/Indexed
- Accessible (MathPlayer reads MathML equations aloud or converts them to graphics)
- Works along with text
- Compatible with CSS, DOM scripting, etc.

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Pictures

In the classical (smooth) category, there is no ambiguity as to what it means for a function u to “solve” an equation such as (1); but once one is in a low regularity class (such as the class of finite mass solutions), there are several competing notions of solution, in particular the notions of a *strong solution* and a *weak solution*. To oversimplify a bit, both strong and weak solutions solve (1) in a distributional sense, but strong solutions are also continuous in time (in the space $L^2(\mathbb{R}^d)$ of functions of finite mass). A canonical example here is given by the [pseudoconformally transformed soliton blowup solution](#)

$$u(t, x) := \frac{1}{|t|^{d/2}} e^{-i/t} e^{i|x|^2/4t} Q(x/t) \quad (2)$$

to (1), where Q is a solution to the ground state equation $\Delta Q + |Q|^{4/d} Q = Q$. This solution is a strong solution on (say) the time interval $(-\infty, 0)$, but cannot be continued as a strong solution beyond time zero due to the discontinuity at $t=0$. Nevertheless, it can be continued as a weak solution by extending by zero at $t=0$ and at $t > 0$ (or alternatively, one could extend for $t > 0$ using (2)); thus there is no uniqueness for the initial value problem in the weak solution class. Note this example also shows that weak solutions need not conserve mass; all the mass in (1) concentrates into the spatial origin as $t \rightarrow 0$ and disappears in the limit $t=0$).

[Terrence Tao's blog](#); PNG equations by LaTeXRender.

Scaled

canonical example here is given by
downwup solution

$$|x|^2/4t Q(x/t) \quad (2)$$

rate equation $\Delta Q + |Q|^{4/d} Q = Q$
on the time interval $(-\infty, 0)$, but

Redone as MathML

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MathML Scaled

l example here is given by the pseudoco

$$\frac{1}{\sqrt{2}} e^{-i/t} e^{i|x|^2/4t} Q(x/t)$$

und state equation $\Delta Q + |Q|^{4/d} Q = Q$. T

CSS Compatible

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Clients

Six years ago, things were rough. But now, with

- [STIX Fonts](#) (free, high quality, comprehensive math fonts)
- Firefox 3.x
- [MathPlayer plugin](#) for Internet Explorer

have high-quality MathML rendering available *almost* everywhere (sorry iPhone users!).

XHTML

- MathML support in browsers only for XHTML+MathML, served with an XML Mime-type.

→ subject to XML's Draconian error-handling

→ MovableType (and other blogging software) not up to task of producing well-formed XML

- several plugins
- extensive tweaking of templates
- 1763 line patch file for MT 3.0
- need to ensure well-formedness of user input

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 - ▶ used to ensure well-formedness of user input

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 - Extensive tweaking of templates
 - **1783 line patch file for MT 3.3**

Need to ensure well-formedness of user input

Ensuring Well-Formedness

1. Forbid markup. Require a pseudo-markup language (e.g. Markdown).

- Disadvantage: limited & users must learn yet another markup syntax.
- Most implementations **fail** to ensure well-formedness. (**Don't** try to produce XML by concatenating strings.)

2. Validate user input.

- Disadvantage: puts onus on user to correct problem(s).
- W3C validator not terribly "light-weight".

Take the input, parse to a tree (vigorously "correcting" it as HTML5). Then use an XML serializer to output the result.

As with 2, unexpected results can be frustrating to users.

Need to retrofit existing system (like MT).

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 - As with 2, unexpected results can be frustrating to users
 - hard to retrofit an existing system (like MT).

Hook W3C Validator into "Preview" Function

Invisible, but unavoidable.

Name:

Jacques Distler

Email Address:

distler@golem.ph.utexas.edu

URL:

http://golem.ph.utexas.edu/~distler/blog/

Text Filter: itex to MathML with parbreaks

Subject: Test Comment

Comment:

Let's try an equation.

\$\$

$$\int_{-\infty}^{\infty} e^{-x^2} dx = \sqrt{\pi}$$

\$\$

Oh joy and jubilation!

PREVIEW

HTML5

In the future, none of this will be necessary.

HTML5 (in progress @ W3C) will allow embedding MathML (& SVG) in HTML.

But

- No existing implementations.
- Could be as long as a decade, before HTML5 Specification is finalized.

How well does it work?

Perhaps, I'm not a fair test-case.

By grim necessity, I became something of an expert on the esoterica of XHTML+MathML.


Fortunately ...

“Average” Users



The n-Category Café

A group blog on math, physics and philosophy

 **March 3, 2007**

A Topos Foundation for Theories of Physics

Posted by John Baez

Here's a big new paper:

- Andreas Döring and Chris Isham, **A topos foundation for theories of physics.**



MathML



Posts with this logo see the equations, Mozilla (with the re

IE/Win users can download a
The posts were authored in [itex](#)
[WebTeX](#)) using the [itexToMML](#)
for [MovableType](#) (the [README](#)

March 2007

Sun Mon Tue Wed Thu



The String Coffee Table

A Group Blog on Physics

Over 1700 Entries, Over 16500 Comments

	Entries	Comments	Trackbacks	Since
Musings	716	2994	443	10/2002
String Coffee Table	292	1708	618	12/2003
n-Category Café	694	11841	1510	8/2006

All well-formed (in fact, valid) XHTML+MathML+SVG.

It “Just Works”

Authors and commenters at (say) n-Category Café don't know or care about XHTML, MathML, well-formedness, MIME-types, ...

They type equations in TeX, use either Markdown or simple (X)HTML markup.

Trackbacks

arXiv.org > math > arXiv:math/0503266

Search or Article-id (Help)

All

Mathematics > Quantum Algebra

The twisted Drinfeld double of a finite group via gerbes and finite groupoids

Simon Willerton

(Submitted on 14 Mar 2005)

The twisted Drinfeld double (or quasi-quantum double) of a finite group with a 3-cocycle is identified with a certain twisted groupoid algebra. The groupoid is the loop (or inertia) groupoid of the original group and the twisting is shown geometrically to be the loop transgression of the 3-cocycle. The twisted representation theory of finite groupoids is developed and used to derive properties of the Drinfeld double, such as representations being classified by their characters.

This is all motivated by gerbes and 3-dimensional topological quantum field theory. In particular the representation category of the twisted Drinfeld double is viewed as the 'space of sections' associated to a transgressed gerbe over the loop groupoid.

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Comments: 25 pages, 10 pictures

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[The Baby Version of Freed-Hopkins-Teleman](#) [The n-Category Café @ golem.ph.utexas.edu/category] [trackback posted Thu Nov 23 15:34:13 2006]

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[Isham on Arrow Fields | The n-Category Café](#) [The n-Category Café @ golem.ph.utexas.edu/category] [trackback posted Sat Dec 1 18:00:00 2007]

The Blog Post

The Baby Version of Freed-Hopkins-Teleman | The n-Category Café – SeaMonkey {Build ID: 20061111}

Back Forward Reload Stop

http://golem.ph.utexas.edu/category/2006/11/the_baby_version_of_freedhopki.ht

Top Up First Previous Next Last Document More

The Baby Version of Freed-H...

For every k , there is a canonical gerbe on G , whose Dixmier-Douady class is just that $\in H^3$. In fact, from a certain point of view $\#$, the central extension $\hat{\Omega}_k G$ is that gerbe on G .

Like a bundle is trivialized by a function. A gerbe may be trivialized by a bundle. Even if the is nontrivial, it can still be “trivialized” in a generalized sense - by a twisted bundle.

Like we have a notion of **K-theory** obtained by taking the group completion of the decategorification of the category of vector bundles on a space, we have a notion of **twisted K-theory** by doing the same with such twisted bundles.

Now, the group G acts on itself by conjugation. We might hence be interested in the K-theory of the quotient G/G . This amounts to looking at the (twisted) K-theory of G -equivariant (twisted) bundles on G .

So that's some ring, let's denote it by

Community

Thriving ecosystem of blogs in Mathematics.

→ Honorary Fields Medalists ([Terry Tao](#), [Alain Connes](#), [Tim Gowers](#))

→ Graduate students ([Secret Blogging Seminar](#))

→ Our aforementioned [n-Category Café](#)

→ And they need a "Commentary Layer" even more than we do.

→ Importantly, they're much further along, in recognizing "alternate" forms of scholarly communication (e.g. [Math Reviews](#)).

→ Our preprint culture predisposed us to embrace [liberalXiv](#).

→ Our "Commentary Layer" culture (MR, etc) predisposed them to embrace blogs.

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• To our aforementioned [re-Category Café](#)

• They may need a "Commentary Layer" even more than we do.

• And importantly, they're much further along, in recognizing "alternate" forms of education and communication (e.g. [Math Reviews](#)).

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As our aforementioned [Category Cafe](#)

colleagues, they need a "Commentary Layer" even more than we do.

Importantly, they're much further along, in recognizing "alternate" forms of scholarly communication (e.g. [Math Reviews](#)).

If EP preprint culture predisposed us to embrace the arXiv,

then "Commentary Layer" culture (MR, etc) predisposed them to embrace blogs.

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They don't need a "Commentary Layer" even more than we do. In fact, if anything, they're much further along, in recognizing "alternative" forms of scholarly communication (e.g. [Math Reviews](#)).

The IER preprint culture predisposed us to embrace the arXiv.

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Arguably, they need a “Commentary Layer” even more than we do.

They've certainly, they've much further along, in recognizing “alternate” forms of scholarly communication (e.g. [Math Reviews](#)).

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Lessons

- **Must** be open-source
- Needs to be easy to set up
 - "one-click install"
- Visitor experience improvements
 - Bring MathML support to WebKit
 - Copy and paste MathML
 - etc...

Collaboration Tool

• The main problems mostly consist of emailing around TeX files.

• Mailbox full of TeX files

• Which one contains the (corrected!) calculation of the cross-section?

• Which one contains that clever argument you had for neglecting interference graphs?

• Did you ever sort out that minus sign?

• Result of using cutting edge technology

• from 25 years ago.

• 25 years is a long time in internet-years.

• So:

• WebDAV (for file sharing)

• SVN (for version control)

• LaTeX for manuscript creation stage.

• Knowledge accumulation, what we need is an latex-enabled Wiki!

Collaboration Tool

Remote collaborations mostly consist of emailing around TeX files.

My desktop is full of TeX files.

Which one contains the (corrected!) calculation of the cross-section?

Which one contains that clever argument you had for neglecting interference graphs?

Did you ever sort out that minus sign?

How is it of using cutting edge technology

only 25 years ago.

25 years is a long time in internet-years.

What?

WebDAV (for file sharing)

SVN (for version control)

Not a lot for manuscript creation stage.

For knowledge accumulation, what we need is an iteX-enabled Wiki!

Collaboration Tool

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An email-box full of TeX files

Which one contains the (corrected!) calculation of the cross section?
Which one contains that clever argument you had for neglecting interference effects?
Did you ever sort out that minus sign?
Result of using cutting edge technology
from 25 years ago.
25 years is a long time in internet-years.

WebDAV (for file sharing)
SVN (for version control)

For manuscript creation stage.

For "knowledge accumulation," what we need is an itex-enabled Wiki!

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Which one contains the (corrected!) calculation of the cross-section?

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Or that of using cutting edge technology

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WebDAV (for file sharing)

SVN (for version control)

LaTeX for manuscript creation stage.

For "stodge accumulation," what we need is an iter-enabled WML.

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Which one contains the (corrected!) calculation of the cross-section?

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What of using cutting edge technology

from 26 years ago.

26 years is a long time in internet-years.

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... "Knowledge Accumulation," what we need is an *itex*-enabled Wiki!

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The result of using cutting edge technology

15 years ago,

15 years is a long time in internet-years.

2000:

WebDAV (for file sharing)

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2005:

LaTeX for manuscript creation stage.

2008:

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CVS (for version control)

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Useful for manuscript creation stage.

For "knowledge accumulation," what we need is an itex-enabled **Wiki!**

Instiki

A Ruby-on-Rails based [Wiki](#).

- Open source.
- Template-based. But easy to replace components which handle user-content with ones which parse their input and then serialize (using REXML) to XML.
- Absolutely *trivial* to set up. Bundled with built-in WebServer.

[My version](#)

- [Maruku](#) (Markdown implementation)
- [itex2MML](#) (itex support via Ruby bindings)
- [xhtmldiff](#) (“redline docs” of revisions)
- (a heavily-hacked version of) [S5](#) (Presentations)

Features

• Multiple (public and/or protected) Wikis under one Instiki instance

• Can publish a read-only version of a password-protected Wiki

• Revision history, with redline "diff"s between successive versions, ability to roll back changes.

• Wiki exports.

• Full LaTeX and extended Markdown input

• Export to LaTeX

• Annotations

Madge: "You're making in it."

Features

- Multiple (password-protected) Wikis under one Instiki instance.

Ability to publish a read-only version of a password-protected Wiki.

Revision history, with redline "diff"s between successive versions, ability to roll back changes.

File uploads.

Full-text and extended Markdown input.

Full-text search.

Full-text indexing.

Exports to LaTeX.

Presentations.

Marge: "You're making it."

Features

- Multiple (password-protected) Wikis under one Instiki instance.
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Revision history, with redline diff's between successive versions, ability to rollback changes.

File uploads.

WikiText and extended Markdown input.

Export to LaTeX.

Page decorations.

Badges: "You're making it!"

Features

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- Revision history, with redline "diff"s between successive versions, ability to rollback changes.

• Embedded

• Full text and extended Markdown input

• Full support to LaTeX

• Presentations

Mudge: "You're speaking in it."

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- Revision history, with redline “diff”s between successive versions, ability to rollback changes.
- File uploads.

Full text and extended Markdown input

$$\int_{-\infty}^{\infty} \delta(x) dx = 1$$

Export to LaTeX

Translations

Madge: “You’re making in it.”

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$$\int_{-\infty}^{\infty} e^{-ax^2} dx = \sqrt{\frac{\pi}{a}}$$

Export to LaTeX

Presentations

Mudge: "You're making no it."

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Madge: "You're soaking in it."



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Conclusions

• Potential for academic communication

• New medium enables new forms of communication

• Different rates of uptake in different subfields, but impact already noticeable

• It's time to "take back the Web."

Conclusions

- New tools for scientific communication.
- **"New" medium enables new forms of communication.**

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No Signal

VGA-1

No Signal

VGA-1