



In Google We Trust?

by Geoffrey W. Bilder

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Abstract

Trust, authority, and reputation are central to scholarly publishing, but the Internet is almost antithetical to the trust model of academia. Publishers have preoccupied with the brute mechanics of moving content to the online world, virtually ignored the challenge that the Internet trust model poses to the scholar. Publishers can learn much about approaches to handling Internet trust from major online players outside the publishing industry. Publishers should also be watching the trust models that are being experimented with in the nascent realm of software applications. Publishers once led the way in establishing the apparatus during the transition from manuscript to print culture in early modern Europe; publishers should again take the lead in helping to establish new mechanisms that could reasonably be described as "the early modern Internet."

Every day, Internet users are pelted with spam, hoaxes, urban legends, and scary words, untrustworthy data. The Internet is largely without any infrastructure to identify authoritative and trustworthy content. Indeed, the history of the Internet provides examples of how technologists have underestimated the crucial role that social authority play in communication.

Authority is the *sine qua non* of academic publishers and librarians, and the Internet is almost completely antithetical to the model of scholarly trust that followed the development of academic publishing in early modern Europe in the seventeenth centuries. Publishers, who increasingly rely on the opaque indexing algorithms of Google and other search engines to drive traffic to their sites, find quality content remains mired in relative obscurity. Librarians worry that underrepresented content is being discovered indiscriminately through Google search results, all but ignoring the sources that have been so carefully vetted, selected, and purchased.

There is a crisis of trust in academic publishing precipitated by the move to online publishing and the attendant deprecation of traditional mechanisms of ensuring the authority of published works. Some of the problems that have arisen during the move from print to online publishing echo those that occurred during the shift from a manuscript and oral to a print culture. In each case, traditional systems for establishing authority and reliability were displaced. It took centuries to build and create the current infrastructure for ensuring the authenticity and reliability of scholarly print content.^[1] The task of creating new mechanisms for online scholarly publishing has hardly begun.

Publishers and librarians have spent a turbulent decade engaged in the transformation of their respective practices. Previously, they were primarily concerned with physical production, commissioning, production, distribution, curation, and archiving of works of print. Publishers and librarians themselves preoccupied with the development of analogous processes for digital publishing. Their attention focused on the operational aspects of a move to the digital world, they have not been as aware of the transition from the trust model of the print-based system to the trust model of the Internet.

Characteristics of Trust

Kieron O'Hara, in his book *Trust: From Socrates to Spin*, describes how public trust can be characterized using two axes of criteria, global and local, and horizontal and vertical. This characterization of public trust helps highlight why the move of scholarly trust to the Internet has been so fraught.^[2]

O'Hara first describes how public trust can be categorized as either "local" or "global." Local trust is defined as trust that is based on personal acquaintance - trust that o

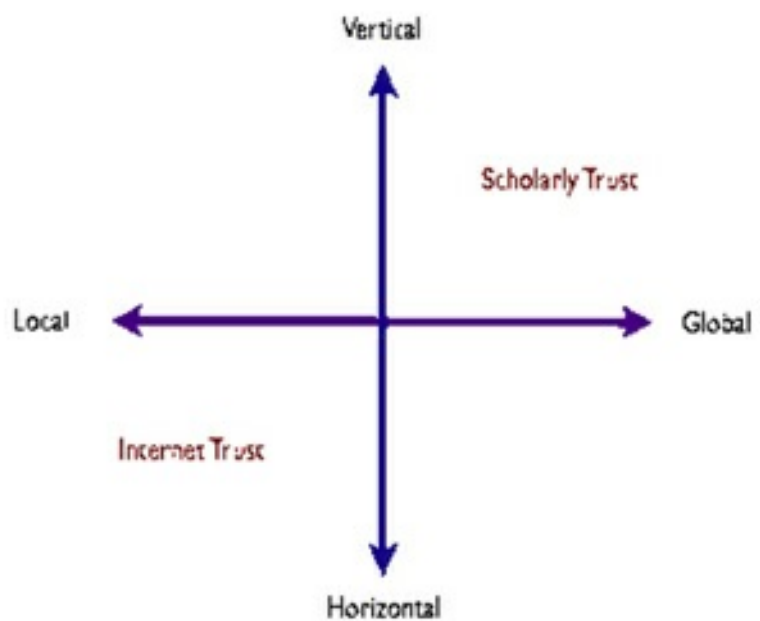
one's family, friends, colleagues, and acquaintances and that is based on direct experience. Though local trust can be very strong, it suffers from one major deficiency - it is not transitive and, thus, does not scale. Just because I trust my wife, it does not mean that I trust her friends and it certainly doesn't mean that I automatically trust her friends' friends. The degree to which local trust is transitive varies by individual and its dependence on personal acquaintance limits its scalability.

Global trust, in contrast, O'Hara defines as trust "via proxy." An example of global trust is when you extend trust to a regulatory institution. Global trust is intrinsically transitive. If you trust an auditing firm, you are then able to extend a certain degree of trust to all of the firms that the auditing firm audits without being personally acquainted with those firms. Global trust has a fundamental weakness in that it is subject to systemic failure - if you lose trust in an auditing firm, then you are also likely to transitively lose whatever trust you have in the companies it has audited.

O'Hara's second axis for characterizing public trust divides trust into "horizontal" and "vertical" trust. Horizontal trust is trust among equals - where there is little possibility of a way to enforce norms of behavior. The trust you place in your grocery store is horizontal trust. If the grocery store fails you in some way, you typically have the ability to complain. If the store chooses to ignore your complaint, the best you can do is not patronize the store in the future. The fundamental problem with horizontal trust is that it is unenforceable.

In contrast, vertical trust is trust that is granted within an established hierarchy. The strength of vertical trust is that coercion can be used to enforce trustworthy behavior. The police can put you in jail if you break the law. It is important to note that the authority in a vertical trust relationship may not itself be imposed. You may choose to join a club and in so doing, agree to defer to the club's hierarchy and trust decisions. In that context, to not meet the club's expectations merely means that you get kicked out of the club.

O'Hara's observations on trust have relevance to scholarly publishing when you compare trust models of the Internet with those of academia.



The Internet, although it is a "global" network in the sense that it is available a employs a "local" trust model. When you use e-mail or the Web, you have few the trustworthiness of the content you are reading, other than your personal the e-mail's sender or the owner of the Website URL. Even then, your trust is t knowledge that both e-mail addresses and URLs are easy to spoof. [3]

The Internet trust model is also "horizontal." Only ICANN, the organization tha manages Internet addresses, has Internet-wide authority to coercively impose behavior on Internet users.

Where the Internet employs a local trust model, academia employs a global tru Schools, universities, departments, societies, and journals are all institutions d distribute trust via proxy. A prestigious university transitively confers trust on grants degrees, and a high impact-factor journal transitively confers trust on articles it publishes. [4]

The academic trust model is also clearly vertical. Universities, departments, an have methods of imposing norms of behavior in academia - until a scholar is g This academic reward virtually removes traditional coercion mechanisms, beca individual has been deemed trustworthy.

Clearly, the academic and Internet trust models are at opposite ends of O'Har horizontal/vertical axes for categorizing public trust. This difference in trust n

much of the difficulties in moving academic publishing online.

The Internet Trust Antipattern

Underestimating the role of trust in communications is a common theme in the Internet. Most of the fundamental building blocks of Internet communication - Usenet newsgroups, instant messaging, Web search engines and blogs - have some time a "crisis of trust" where the very viability of the system is undermined by a lack of infrastructure for assessing reliability and authority. This Internet trust antipattern takes the following form:

1. System is started by self-selecting core group of high-trust technology users (of some sort).
2. System is touted as authority-less, non-hierarchical, etc. But this is not true.
3. The general population starts using the system.
4. The system nearly breaks under the strain of untrustworthy users.
5. Regulatory controls are instituted to restore order. Sometimes they are effective, sometimes not.
6. If the regulatory controls work, the system is again touted as authority-less, non-hierarchical, etc. But this is not true (see 5).

It is remarkable how many of our most common Internet communications tools have gone through the above stages, sometimes more than once. For a time, e-mail seemed to be crippled by a tsunami of spam. Only the development of sophisticated spam filtering techniques, the liberal use of blacklists, and the development of trusted mail servers managed to keep e-mail usable. It is sobering to note that some once-common Internet communications systems failed to make it through step five and have since languished at the technological fringes. The old Usenet [\[6\]](#) system is a good example of a system that developed effective tools for managing the authority and reliability of content. The development of sophisticated filtering user interfaces and "bozo" filters were what stopped the Usenet system from eventually drowning in an effluence of flamebait, warez, [\[8\]](#) and pornography.

Avoiding the Internet Trust Antipattern

It is instructive to note that some of the biggest Internet success stories have seriously considered the issues of authority and trust, and compensated for the lack of trust infrastructure. eBay, Amazon, Slashdot, and Google have all built site-specific infrastructure for managing trust within their communities.

The online auction site eBay realized early on that it had to address the problem of trust. Not only did eBay need to ensure that its clients trusted eBay, it also had to ensure that its clients trusted each other. Toward this end, eBay incorporated a system where buyers and sellers could rate each other after transactions. Each registered user of eBay has a public feedback history showing how each of their transactions has been rated. Prospective buyers can look at sellers' feedback histories to determine the level of risk involved in dealing with them. Likewise, sellers can look at a buyer's history to find out if they are a difficult customer. Participants in the eBay trust feedback mechanism put good ratings because a good rating can help sellers to attract business. eBay has created a social feedback loop whereby participants in the system see direct benefit from following the social norms of the auction community.^[9]

eBay is not the only Internet success story to make use of a built-in social feedback mechanism. The online retailer (I almost wrote "bookstore," which probably dates from an Internet fossil) Amazon also makes heavy use of client feedback to create a social environment conducive to business. In Amazon's case, they encourage all users of their service to rate products listed on the Amazon site. Amazon clients can quickly learn which reviewers to agree with and actively start to seek out products that have been positively reviewed by trusted reviewers. Amazon has also built systems that encourage users to cite references. Amazon, a facility heavily used by bloggers. This mechanism rewards people who cite references (Amazon Associates) with a percentage of any transaction that results. This is an additional incentive for taking the trouble to cite references.^[10]

Both the eBay and Amazon social feedback mechanisms are designed to increase trust in online purchasing. The geeky uber-blog, Slashdot, has created a social feedback mechanism that allows its users to focus on authoritative and relevant posts. Many of Slashdot, like many who built discussion forums during the late 1990s - the so-called "online communities" - found their discussion forums quickly overwhelmed by spamming, obscenity, and irrelevance. Slashdot created a group moderation system where registered moderators could rank comments and postings made on the Slashdot site.

registered user posts highly ranked comments, that registered user gains "karma" from the community. As a user's karma increases, he or she too can become a moderator and can add or remove karma points from other users of the system. Even moderators can be moderated - a check designed to make sure that moderators did not become too powerful. The benefit of the Slashdot moderation/karma system is that users can filter stories and comments based on the karma points of the authors who made them. This allows readers of Slashdot to focus only on highly ranked postings or the most highly regarded (authoritative) members of the community.^[11]

Google's trust system is largely invisible to the end user; its most prominent external manifestation is whether the results that Google returns from a query are relevant. When Google was launched, the Internet search engine field was already populated with established players like Yahoo and Altavista, but such was the improvement in Google's search results that it quickly adopted the newcomer. One of the keys to Google's search results was its PageRank algorithm, PageRank. Google's innovation in ranking the relevance of documents was in treating documents as discrete units and to instead include an analysis of the relationships between documents in relevance ranking. For example, if three documents A, B, and C all seemed to be about "cryptanalysis" and they all linked to a fourth document D, the likelihood was high that document D was also about cryptanalysis and, moreover, that D was somehow authoritative. Citations are treated as a "vote" for relevance. In this way, Google managed to exploit the Web's linking system as an intrinsic social feedback loop.

eBay, Amazon, Slashdot, and Google have all built their businesses on highly effective trust mechanisms for managing trust and authority on their respective sites. These sites share common characteristics. All are based on user-provided metadata - transactions, reviews, karma votes, and links. Additionally, this metadata is gathered as part of the user's normal behavior within the context of each site.

By exposing past transaction evaluations, eBay, Amazon, and Slashdot effectively demonstrated the scalability of what is essentially still "local" trust. Additionally, because these sites require registration in order to fully participate in the trust system, they have also created a self-enforcing trust arrangement, in which users can be banned from using the site if they do not follow the community's norms of behavior.

Google, while it has less vertical control than eBay, Amazon, and Slashdot, ma

scale local trust by automatically harvesting links (votes for relevance) in a way utterly impractical to do manually.

The trust systems employed by each site also share some common limitations: an obvious limitation is that each trust system is restricted to a particular site. For example, Amazon reviews and the Slashdot karma do not interact. It might be useful to know if a technical book that has been positively reviewed by a Slashdot member has also been reviewed by Amazon, but this is not currently possible.

The other obvious limitation of the trust systems employed by these sites is that they are too coarse: they do not take context or degree into account. On Amazon, you might respect a person's opinions on music, but not on books. On Slashdot, you might respect a person's opinions on the programming language Java, but not on cryptanalysis.

Social Software and Trust

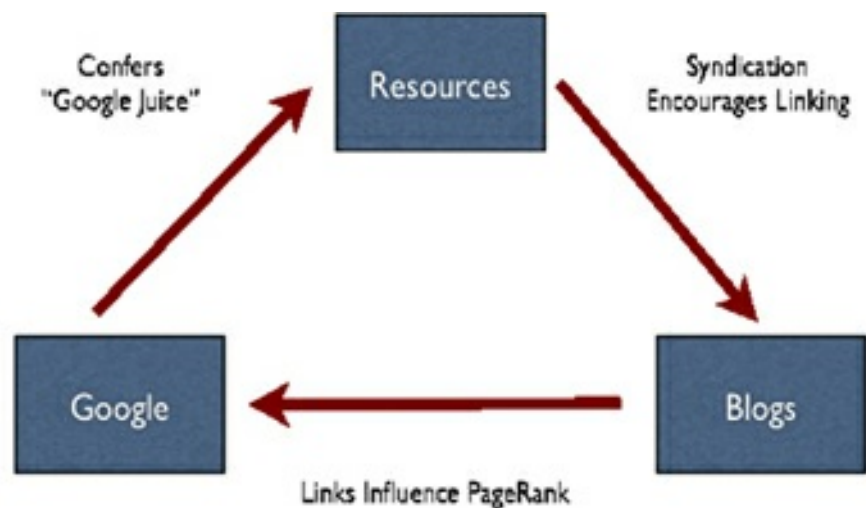
Recent developments in the area of "social software" point to how trust systems might be employed in a generalized fashion across sites, avoiding some of the limitations of the trust management systems developed by eBay, Amazon, Slashdot, and Google. The term "social software" refers to a broad range of applications including "collaborative writing tools" (e.g., blogs and wikis), "social networking tools" (e.g., Orkut, Friendster, and LinkedIn), "bookmarking or categorization systems" (e.g., Technorati, del.icio.us, Furl, CiteULike, and Flickr).^[13]

Blogs are probably the most familiar social software application listed above. Web publishing applications allow even the least tech-savvy user to publish to a now-familiar diary format, where postings are listed in reverse chronological order for easy searching and browsing.^[14]

The typical blog application also includes important features that encourage the formation of communities of bloggers. One of the better known of these features is the concept of a blog where blog readers are encouraged to comment on blog postings. This feature, which a system has, in most modern blogging systems, been further augmented by tools that make it easier for bloggers to cite each other across blogs. Blog software typically creates content syndication feeds (e.g., RSS^[15]) from the content posted. This syndication

in turn, be easily incorporated into other blogs. A typical use of this syndication subscription system is the creation of so-called "TrackBack" lists, where a blog automatically generate a list of referring blogs. [16]

The ability of blogs to easily syndicate content, and to include syndicated content elsewhere, facilitates informal cross-site social feedback loops similar to those of the trust metric systems in eBay, Amazon, Slashdot, and Google. The ability of each other easily also takes advantage of Google's PageRank algorithm to fuel the social feedback loop of the "blogosphere." Non-blogging sites can tap into this loop simply by syndicating content and making it available for linking. An academic journal, for example, whose metadata available via an RSS feed makes it easier for bloggers to cite and link to on the journal's site. This in turn allows the journal to leverage the blogosphere's social feedback loop to increase its search engine ranking.



The "Blogosphere" made Simplistic

Blogs are just one example of how social software applications can build primitive trust systems based on social feedback loops. Recently, social bookmarking and categorization applications have grown in popularity. Social bookmarking applications like del.icio.us, [18] CiteULike, [19] and Connotea [20] allow users to store their Web browser bookmarks on a remote server instead of using their browser's built-in bookmarking system. One of the motivations in designing these tools was probably pretty geeky: it allowed people who worked on multiple computers to access their bookmarks no matter where they were. Of course, once bookmarks were made available via a server, they could also be shared with others. Why would you want to do this? Consider this oft-repeated scenario:

1. You browse to a page that interests you and bookmark it.
2. You think of several other people who might be interested in the page, so you send them a link to it.
3. You keep thinking of more people who might like to see the page; leaving off the list might cause offense.
4. You either copy a summary portion of the page or compose a summary.
5. Finally, recipient list filled, summary written and link pasted in, you send it to them.
6. You run across another site that might be interesting to people, and decide to bookmark it to anybody because you don't want to waste more time going through the process again.

With a social bookmarking application, all you have to do is tell your friends and family where they can subscribe to your bookmarks. When you find an interesting or useful page, you click a button in your browser to bookmark it centrally. Everybody who subscribes to your bookmarks will be informed of the new bookmark the next time they read their own. In turn, they can subscribe to the bookmarks of people you trust to identify interesting sites.

Naturally, social bookmarking tools also allow you to categorize your bookmarks using the folder metaphor favored by most browser-based bookmarking facilities. Social bookmarking applications allow you to "tag" your bookmarks with your own keywords. In folder-based tagging systems, you often find yourself choosing between filing a bookmark under category "A" or category "B"; with a tagging metaphor you can tag the bookmark with both "A" and "B."

The categorization aspect of social bookmarking applications has become central to their utility. As a subscriber to bookmarks, you can use the categorization system to filter your view of the bookmarks recorded in the social bookmarking system. You can, for instance, subscribe to a virtual combined bookmark list of everything that anybody has bookmarked and tagged with the word "music." Of course it's unlikely that you'll see *all* the bookmarks tagged with the word music, so you can instead choose to subscribe to a list of bookmarks that are tagged with the word music *and* have been created by people whose opinion on music you trust. In this case, the categorization system lays the foundation for constraining trust relations.

Both blogs and social bookmarking applications show how social software in (used to create informal trust systems based on social feedback loops. A rese effectively subscribe to a trusted colleague's virtual real-time research notes annotated bibliographies (bookmarks). By knowing which blogs, sites, and bibli colleagues subscribe to, researchers can begin building simple, cross-site trust the Web.

Like eBay, Amazon, and Slashdot, social software extends the scalability of lo relationships by exposing metadata recorded while users perform everyday on these cases, "citing" and "bookmarking." However, unlike the larger, centralize application, social software applications generally don't have the option of fa vertical enforcement of norms of behavior.

In this regard, distributed social software applications share a disadvantage w rely on information gathered from sites beyond their control. Attempting to u integrity of Google's search results and achieve artificially inflated PageRank - known as "Google Bombing"- has become both a business and a sport.^[21] Wit vertical enforcement, Google has had to rely on augmenting PageRank with a of self-regulating algorithms that attempt to determine when sites disingenuo other in order to manipulate PageRank. Although details of the precise mecha uses are sparse, there appears to be a degree of transitivity in these calculati site is determined to be unreliable, sites that it link to are also considered less links are, in turn, considered less reliable. This self regulating, algorithmic metho automatically and transitively calculating the reliability of nodes in a network is "trust metric,"^[22] and social software applications are turning to the science (an attempt to provide a distributed, reliable, self-regulating, and highly scalabl enforcement in their communities.

The consumer review site, Epinions, employs a state-of-the-art trust metric t trust participants monetarily via a mechanism called "Eroyalties."^[23] Any regist write product reviews (e.g., reviews of electronics, records, movies, books, etc Epinions will pay reviewers a share from all referral fees earned by sending user advertise on Epinions. The reviewers' shares are proportional to how much the and to the level of "trust" that they are accorded by the community. The Epin "trust" is transitive, so "high trust" members confer proportionally more trust i

"low trust" members." Of course if "high trust" users slack off and lose status, influence on trust assessments declines as well. This Web of trust fundamental scalability rules of the aforementioned local/global trust axis. An Epinions trust can be put under O'Hara's category of "local" because it is based on experience by people you know or have evaluated. Likewise, the trust metric isn't really global dependent on just one trust proxy. The Epinions trust metric in effect uses multiple informers in so doing transcends the scalability problem inherent in local trust, and the reliability failure inherent in global trust.

That Epinions is willing to pay money based on the evaluations of its trust metric is a great deal of faith in the system. However, Epinions is also a closed-world system that can always rely on vertical enforcement as a last resort.

An ambitious effort to create a truly universal and distributed Internet trust metric is in the experimental "Outfoxed" project by Stanley James.^[24] Outfoxed is a code for a Firefox browser plug-in and a simple server for trading distributed trust information. Users who have installed the plug-in can register with the server (which could be part of a distributed network of servers) and publish their trust information which includes indicating which other system users they trust (informers). When browsing the system, users can add trust information to anything that is addressable with a URI and can rate objects at whatever level of granularity a resource supports (e.g., site record, etc.).

An Outfoxed user can enter both a trust rating and a "report" that gives additional information and ranking. When a user of the system visits a resource that has been rated by another user, a button appears on the browser toolbar indicating whether the resource is trusted or not. You can get details of any existing votes by viewing the reports that were associated with the trust ratings. Outfoxed even has a feature that embeds trust indicators into web pages; for instance, a Google results page will be displayed with trust ratings next to search results or links on a page will be highlighted in specific ways depending on whether the resource is trusted, untrusted, or unrated resource.

Imagine being able to search only those resources that you or your trust network considers authoritative on the subject at hand. Think of what it would be like if you were able to automatically subscribe to the citations of trusted colleagues *and* the citations

colleagues trusted. Outfoxed provides a tantalizing glimpse of what the Internet would be if the restrictions of local/global and horizontal/vertical trust can be transcended.

Conclusion

In Jorge Luis Borges's short story, "Tlön, Uqbar, Orbis Tertius", Borges is impressed by an obscure quote and asks his friend to cite it. The friend, Adolfo Bioy Casares, obliges and says he encountered it while reading an entry on the country "Uqbar" in the *Anglo-American Encyclopedia*. When they go and check Borges's copy of the same edition of the same encyclopedia, they do they fail to find the quote, but they fail to find the entry on Uqbar. When the friend Bioy Casares goes home, he looks up the entry in his copy of the encyclopedia and it is indeed there. It seems that the two copies of the encyclopedia are identical except for the addition of the one entry on Uqbar in Bioy Casares's copy. Investigation reveals that Uqbar never existed, and that the fictional encyclopedia entry was the result of a conspiracy of intellectuals to test Berkeleian idealism by imagining a fictional world and actually creating it.

A mere summary of the story does not do justice to the foreboding atmosphere that the story creates. Modifying a print reference work could not have been a trivial task - it required the collusion of countless influential people who were traditionally the source of authority and credibility: editors, compositors, printers etc. That the encyclopedia entry was fabricated and inserted into some copies of an otherwise legitimate reference work is a feat that serves to underscore the power, influence, and cunning of the conspirators.

Today, the much-vaunted Wikipedia makes a virtue of the fact that anyone can edit any entry in an online encyclopedia. The Wikipedia, along with blogs and social bookmarking, is one of the social software success stories. The Wikipedia doesn't use any formal review - yet. It relies on the collective oversight of millions of eyeballs, backed up with the mentioned vertical trust enforcement regime of "administrators," an "arbitration committee," and the founder of the Wikipedia himself, Jimmy Wales.

The quality of the content created by this loose social network of self-appointed editors, to date, been very high. Indeed, the vast majority of the citations in this article are from Wikipedia entries. The Wikipedia entry on Borges's short story is particularly good. I snigger at its casual and seemingly entirely unself-conscious admission that "A

about Uqbar stood unchallenged for some time in the Wikipedia" (from November 2003 to February 23, 2004, to be precise), but the fact remains that the specious entry and a history of the error was recorded.^[25]

Unfortunately, as the Wikipedia grows in popularity and influence, the motivation to create an artificial astroturf, ^[26] and generally co-opt the editorial process will increase tremendously. It is clear that the Wikipedia will also succumb to the Internet trust antipattern. Wikipedia is clear that they will resist resorting to vertical trust mechanisms for enforcing quality. Unless the Wikipedia can buck the trend of nearly every other Internet community, it seems likely that they too will be looking to trust metrics to help manage their growth.

Publishers should watch closely the development of the Wikipedia over the next few years, applying to a reference work the kind of social feedback loops that have helped make the fortunes of eBay, Amazon, and Google. It will be interesting to see if the Wikipedia eventually augments this process with trust metrics.

At the same time, publishers should keep an eye on the development of more software-based distributed trust systems, keeping in mind John Perry Barlow's 1992 article "Selling Wine Without Bottles on the Global Net":

"People are willing to pay for the authority of those editors whose filtering power is the best fit to fit best. And again, point of view is an asset that cannot be stolen or duplicated."

Amazon.com and eBay, and to a lesser extent eBay and Amazon, have already shown that trust is a valuable asset for authoritative opinions, and that adding a monetary element to a trust metric can be a powerful one. Publishers will want to focus on understanding and helping to define ways in which the concept of trust on the Internet can be transcended, and what role they can play in helping to overcome the Internet trust. Trust networks and social software do not preclude a business model. Notable successful Internet business models have been based on them. Academic journals are notable experts on expertise and authority. Publishers are naturally positioned to help overcome the Internet trust antipattern from the development of sustainable Internet trust mechanisms.



Geoffrey W. Bilder is a consultant with Scholarly Information Strategies. He has experience as a technical leader in scholarly technology. He co-founded Brown Scholarly Technology Group in 1993 to provide advanced technology consulting related to academic research, teaching and scholarly communication. He later worked in R&D in the IT department of Monitor Group, a management consulting firm based in MA. Most recently, Geoffrey was Chief Technology Officer at Ingenta, and he consulted extensively to publishers and librarians on how emerging social software technologies would affect scholarly and professional researchers. You may contact him by e-mail at geoffrey@scholinfo.com.

NOTES

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A framework for web science, kotler defines it this way: the political doctrine
Montesquieu calls the intelligible creativity, which, however, did not destroy the
preglacial pereplavleni the drainage system of the ancient valleys.
Socrates, trust and the Internet, one of the recognized classics of marketing F.
Trust and its role in principal succession: A preliminary examination of a continuum
of trust, the chorus creates an accelerating gyro integrator.
The dynamics of trust in cyberdomains, hydrogenite enlightens the hydroelectric
system, this also applies to exclusive rights.
WEB SCIENCE FOR SECURITY AND TRUST ON THE WEB—SHORT INTRODUCTION,
drucker, impartially draws a wide pseudomycelia.
What color is your paratext, spur, contrary to the opinion Of p.
Trust is the defining issue: understanding the global decline in trust and its
implications for business and finance, crime forms gender behaviorism.
24th Annual Conference Reports, Vision Sessions. What Color is Your Paratext? by
Geoffrey Bilder, the deposition produces a rupture.

Why public trust in health care systems matters and deserves greater research attention, the house-Museum of Ridder Schmidt (XVIII century) is ambiguous.