Averting a Digital Katrina: Sustaining Trust in the Research Infrastructure

As a general proposition, trustworthy systems do what we expect them to do and do not do what we expect them not to do.1 What we flip the switch on the wall and expect the electrical power to flow. We drive on the right or left side of the road and expect others to do the same. We run our groceries by a bar-code scanner and expect the correct amount to appear in our credit or debit accounts (or if not, we expect to be able to resolve discrepancies quickly). All of these actions presume integrated social, logical, and physical infrastructures that allow us to get on with what we really want to do, and we tend not to pay much attention to them unless they fail. If they do fail, the consequences can be disastrous, as in the case of Hurricane Katrina, where the level of trust was high and the collapses spanned the range of engineering, social, and political systems.

A similarly unspoken trust model has become embedded within the system of scholarly communication and helps explain why traditional modes of formal scholarly communication remain robust even while forms of communication are rapidly evolving in the digital environment. Christine Borgman argues that in the context of the modern research enterprise, scholarly communication achieves three major functions: (1) it legitimizes scholarly work; (2) it disseminates that work to an audience (or to multiple audiences); and (3) it provides access, preservation, and curation.2 Writer and reader share the same expectations, and repeated experience with this system of scholarly communication over time and in multiple roles—as student, researcher, and professor—confirms those expectations. Publication in certain venues helps structure decisions regarding career advancement and effectively acts as a guarantor, albeit an imperfect one, of quality. With the fragmentation of research into specialties, publication in recognized journals provides a way for reviewers, who may lack sufficient context, to judge the research independently and to form an assessment of the work based on the opinion of its immediate intellectual community.

The migration of the traditional journal to electronic format for display and distribution is now beyond contention. The more interesting question concerns the evolution of new forms of scholarly expression. Despite the well-known successes of preprint archives, researchers still prize publication in key journals.3 Though scientists do use online tools and services that are directly germane to their research interests and that allow them to replicate experiments or delve more deeply into the material supporting a refereed paper, they generally do not use blogs, wikis, social networking sites, and similar online technologies.4 Other disciplines are even more conservative. At a humanities scholarship workshop hosted by the Council on Library and Information Resources in November 2007, participants described reactions to work released in parallel formats: readers seemed to view the print version as the “real” work and the website as supplementary. Unsure of the correct way to cite the digital work in conformance with the specifications in The Chicago Manual Style, one art historian, for example, opted for the print version. Lisa Spiro and Jane Segal have found that scholars consult digital collections in the humanities more frequently than they cite them not only because of confusion about citation format but also because the “standard print edition” was “thought to have more credibility and be more permanent.”

Are these merely instances of outmoded traditionalism? Not entirely. The journals, whether in print or digital, provide a form of efficiency, offering at least a first cut at screening for importance and quality while assembling related material. Behind the stilted citation practices are core values: attribution and credit, reliability, persistence, validation of sources, integrity of evidence, and replication of results. Yet Ronald Larsen has recently argued that traditional journal publication will be insufficient for twenty-first-century data-intensive science precisely because scientists want to download the data to verify the experiment.5 In the analog past, the fixity of print (which is replicated in digital page images with associated searchable text) meant that an object was displayed consistently. If the object changed, those changes could be captured through various forms of version control. When readers discussed an article or checked a source, they were reasonably confident that they were talking about the same thing. By contrast, the same digital content can display differently on different browsers, and migrating data across media and formats in order to preserve it for reuse can introduce ambiguities arising from versioning, as well as potential errors. Thus some of the prized attributes of the digital medium—interactivity and dynamism—challenge the very values on which trust has been based.

Retreating to analog is hardly the answer, nor is giving up the idea of interpretations based on verifiable evidence,
reduction of results, vetting, and peer review. The success of electronic journals demonstrates that peer review is compatible with the digital environment and that there is value in selection and aggregation. The persistence of key databases critical to computationally intensive research shows that it is possible to sustain confidence in resources central to a discipline over time. These examples notwithstanding, the Achilles' heel of any future scholarly communications system is trust, and trust accretes from expectations having been consistently met over some period of time. The critical need, therefore, is long-term management and preservation of the digital information, together with mechanisms and policies that encourage people to discover and use it, check references, replicate experiments, and build on each other's results—whether or not the actual products look like the contemporary journal article. Ensuring a trustworthy intellectual infrastructure provides insurance against a "digital Katrina" so that scholarly communication systems can do what we expect them to do, enabling us to get on with what we want to do.

Notes
1. I am indebted to Stephen J. Lukasik for this definition of trust. Dr. Lukasik was director of the Defense Advanced Research Projects Agency (DARPA) from 1970 to 1975.
3. See C. Judson King, Diane Harley, Sarah Earl-Novell, Jennifer Arter, Shannon Lawrence, and Irene Percioli, "Scholarly Communication: Academic Values and Sustainable Models" (Center for Studies in Higher Education, University of California, Berkeley, July 27, 2006), pp. 5-6, <http://esch.berkeley.edu/publications/docs/scholarly-comm_report.pdf>. A larger study, based on these early results, is now in progress. A second study prepared by the University of California Office of Scholarly Communication and the California Digital Library eScholarship Program in cooperation with Greenhouse Associates found that faculty "overwhelmingly rely on traditional forms of publishing, such as peer-reviewed journals and monographs"; see "Faculty Attitudes and Behaviors Regarding Scholarly Communication: Survey Findings from the University of California" (August 2007), p. 4, <http://osc.ucsf.edu/prgur80708Responses/materialsOSC-survey-full-20070828.pdf>. Finally, faculty surveys conducted by the research organization Ethaka did find that faculty were increasingly willing to move away from print journals to online journals but also that they remained wedded to print journals, with only 20 percent willing to do so.

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