Seeing the forest: why publishers and readers need to take a fresh look at print and online publishing to create a sustainable information industry

The emerging debate over whether print or online publishing is better for the environment is complicated by the fact that there is not yet a measurement system that publishers, readers, librarians and other interested parties can go by. Both mediums have their pros and cons. Paper is made from a renewable resource, but the supply chain involved in getting a book from printer to reader is extremely inefficient, both economically and in terms of climate impact. E-books and databases have a considerable environmental impact due to the way they are stored as well as the necessary electronics needed to access them, but professionals as well as the public often assume e-publications are better for the environment. The industry needs ways to quantify its ecological footprint before it can make informed decisions.

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During the 18th century, a new technological process saved untold numbers of trees from being cut down to make charcoal for the iron smelters that were popping up all over England. That new process, in which coal is baked into coke, thus driving off its impurities, saved millions upon millions of trees by making charcoal suddenly obsolete.[1] But is coal a clean technology? The answer, by most accounts, is a resounding "no."

Similar occurrences of one technology or process replacing an older one happen all the time: witness the eternal struggles of margarine vs. butter, or sugar vs. its manmade cousins.

One of the newest battlegrounds involves print and electronic books (and online information sources). Putting aside the issue of aesthetics and the practical considerations of cognition, publishers, readers, librarians and others need to know which medium is better for the environment. It is not a question that is easily answered. We want to do the right thing, but it is difficult when there is so much contradictory information to wade through. It is now common to have an e-mail signature, for instance, that tells recipients, 'Please consider the environment before printing this e-mail'.

People often think of p- versus e-books as a 'no brainer' – obviously e-books are better for the environment! In fact, the question of which form of publishing is more ecologically sustainable needs a hard look.

We have become really good at seeing the trees, but we are not seeing the forest. That is, the entire information industry, in which librarians and publishers and authors live their professional lives and create their carbon footprints, needs to come to terms with the fact that online distribution, storage and retrieval have considerable environmental impact – and that an e-book may kill more trees through deforestation than the production of an equivalent print book.

Where do (paper) books come from?

Perhaps scarred by images of clear cut forests and activists chained to trees, many people assume that all tree harvesting must be bad. One international body that works to improve forest management practices is known as the Montréal Process, formed in Geneva in 1994. The group's goals are to conserve biological diversity, and to maintain ecosystem health and the long-term socio-economic benefits of a well-run forest ecosystem; it also provides a legal framework, a template if you will, for governments and land owners to work with.[2] Well-managed forests provide jobs, recreational opportunity and habitat, in a way that a Congolese coltan mine does not. No matter how well-sourced the paper for a book is, though, if it ends up moldering away unread in a closet somewhere, that paper has been wasted.

Sadly, the electronic publishing industry has no Montréal Process, which strikes at the heart of the problem: we have absolutely no way to accurately gauge the effects that e-publishing has on the environment.

As one blogger put it recently, "I've heard that there are enormous Googleplexes in the middle of nowhere, secretly sucking up megatons of power. I understand that the 'Archive' neverland is actually a real place on a hard drive somewhere within that Googleplex. So this morning I set out on a (LONG) quest to find out how much energy it takes to store an e-mail message. I must say, I searched and searched and did not find a solid answer."[3] There are no solid answers – yet.

The production of paper, of course, is not without its problems. For one thing, paper mills, generally, stink – a problem the United States Environmental Protection Agency calls a 'nuisance' but not a health hazard.[4] The biggest problem may be the industry's supply chain, which in its current form is beyond wasteful. Currently, a book can travel between half a dozen very distant places before it winds up in a reader's hands. According to management consultant James Lichtenberg, "this ... represents hundreds of millions of dollars in annual costs to book publishers, distributors and retailers ...The combined costs, including the costs of returns, puts an enormous, perennial drag on the profitability of our business."[5] If all those wasted miles and unnecessary middlemen are bad for business, they are even worse for the environment.

Some technology is being developed to improve the situation. RFID (radio frequency identification), the technology used by highway toll collectors that allows drivers to pay without stopping, shows promise for trimming the fat from the supply chain, although its potential uses and ramifications for the print publishing industry are still being studied.[6] Soy-based inks are replacing traditional petroleum-based inks, amongst other improvements.

Where do (online) books come from?

I (Karen Christensen) am an environmental author (whose first book was chosen one of Britain's Top 20 Green Books in the *Observer* newspaper's Green Book Fortnight 1989) as well as a reference publisher who focuses on global issues and especially sustainability. This makes the question of p- versus e- publishing of special concern to me. Once we learned about the hidden costs of electronic publishing and communication, we added to our signature admonition about not printing unless necessary the words 'please don't forward or archive this e-mail'. We have embarked, with some of our expert authors, on gathering all the research we can find on this subject of print versus online publishing, and encouraging wider recognition of the undoubted fact that all forms of published communication have environmental impact. Our aim is to expand the awareness amongst the academics and librarians and publishers we work with that ours is an industry that needs to become more attuned to our impact, and to find opportunities to set a sustainable course.

There are many surprising aspects to this. When I chaired the Green Data Centres conference in London in 2008, I learned that interactive or social networking websites require much more energy than simpler sites. So-called 'legacy software' (the speakers mentioned Microsoft in particular) requires more energy to run than more nimble and less bloated technology. Data centers, the huge but all-too-invisible banks of servers we all depend on, operate much more efficiently with new software.[7] (The EPA estimates that a typical data center is 40 times as energy intensive as a conventional office building.[8])

In January, IBM researchers in Zurich set a new record for data storage density using linear

magnetic tape; the tape was 39 times more effective than the previous industry standard had been, which in turn is far more efficient (and cost-effective) than using hard drives to store data. So, in the near future, it might not take quite so much energy to store a book online.[9]

Why paper is a popular scapegoat

Readers and librarians and publishers are aware that most paper comes from trees. There are alternatives: kenaf and hemp, for example, but it is a rare book printed on anything other than wood-pulp paper, so papers truly are made from trees.

But there's paper and paper, as I learned in 2004 when I signed up to write a new book for a London publisher, called *The Armchair Environmentalist*. I was reluctant, because I was in the midst of launching a new publishing company and not really up for writing a book. One of the ways they persuaded me was by telling me it would be the first book published in the UK under a program called the Greenpeace Book Campaign.

I read about the Greenpeace effort with great interest, and saw the stories coming out in the British press as they tried to raise consciousness about the issue of paper sourcing. But I had mixed feelings, now that I was myself becoming a publisher, because I knew I'd have to think about the cost of alternatives, and the longevity of the paper stock, and the general hassle of trying to do something different.

I arranged to visit Greenpeace on a trip to London. It was in their offices in Islington that it occurred to me that publishers were awfully easy targets for a publicity campaign about any environmental issue. I blurted out, "What are you going to do about the computer industry? Think about the waste they create – that's going to make a huge difference as e-books are adopted". Although they expressed no interest at the time, I am pleased to see that they now have a fledging program called Greener Electronics, with a gauge for determining which companies make electronics that can be 'upgraded, recycled, or disposed of safely and don't end up as hazardous waste in someone's backyard'.[10]

Today, people are reading books on Kindle and on the iPhone, and libraries are moving faster to online resources and services. As this transition speeds up, the assumptions that technology is benign, that new is better, and that online is cheaper become seriously worrying. We need to be more analytical and skeptical as we enter a new era in information creation and distribution. I remember the 1970s, when people were proud to have clean office parks instead of belching smoke stacks, but it turned out that the chemicals used to clean silicon chips caused Silicon Valley to end up with more Superfund cleanup sites (29) than anywhere else in the USA.[11]

There is clearly an urgent need for more study to be done of how much, exactly, e-mails and online storage costs the environment. Only then can we really be sure if online or print publishing (or a combination) is the better option.

A BMI for publishing

What we need is something akin to a body mass index for the publishing industry: a 'PIBMI'. A BMI helps to determine a healthy weight range for one's height and body size. Various factors, such as waist circumference and gender, shape the outcome of the test. The results determine your level of risk from such things as heart attack and stroke. From there you can decide if a simple diet will do, or if you should monitor your cholesterol, or if you really do need to lay off the pumpkin pie à la mode for a while.

A system like the proposed PIBMI could be used to determine many things. You want to be able to compare apples to apples, rather than apples to cuttlefish, or robots, as is currently the case. Only then can you determine the 'true cost' of an item. As William Rees, the originator of the 'ecological footprint' concept, writes, "in a true cost economic system, consumer prices would incorporate environmental, health, and other welfare damage costs of production. When prices 'tell the truth' about costs, consumers adjust their consumption patterns accordingly, purchasing fewer ecologically costly goods."[12]

What needs to be compared, explained Don Carli, senior research fellow at the Institute for Sustainable Communication, is the 'embodied energy', also known as 'gray energy' or 'emergy', in an object, in this case a book or its online equivalent. Most of the environmental impact of print books comes from the making of paper and its transportation; while the environmental impact of e-books comes from data storage, maintenance,

distribution, raw material extraction, e-waste disposal and toxic clean-up.[13]

For instance, say that you (publisher X) are faced with the familiar question, "should we print on paper, online, or a combination of both?" Instead of wading through a maze of factoids and misinformation, you could make a graph based on various factors:

Is your target audience interested in online books in the first place? A simple scale could be used to describe your audience: 1 to 10, with 1 being more likely to prefer paper, 10 less so. This number would then become part of the algorithm.

The As Yet Imaginary International Measurement Agency has determined that, based on your location, size, etc., a full-color page for a gardening book uses Y amount of energy per user per day to be stored online, or Z amount of energy per printed page. Based on the 1–10 score from above, what would make the most sense to use given your particular circumstances?

Where is your target audience? If you are putting out a guidebook on hiking in the Cotswolds and you're located nearby in Cheltenham, it would probably make sense to focus on paper. If, however, your readers are far away in Australia and New Zealand, that might not be the case.

Where does the energy that powers your data storage come from? Websites like ilovemountains.org can tell you if your electric company (and thus the nearest data center) uses coal stripped from mountaintops, for instance, which might sway you toward paper.

What is the 'embodied energy' of the paper your printing company uses? Tools like the Environmental Defense Fund's paper calculator let you know how many BTUs of net energy are consumed making the paper, the greenhouse gases that are released in its production, etc.[14]

What is your flexibility? In other words, once you've committed to one medium or the other, how hard is it to change gears?

Librarians can use these same metrics to determine what is best for his or her library: will a book get checked out dozens of times, or will it just take up space? An author looking for a publisher could decide to limit his or her search using the same criteria.

This does not all have to happen in the future. Acquisition librarians today can help by asking any supplier (print or digital) for things such as an environmental product declaration (EPD), or the results of the aforementioned paper calculator, among other things.

The point is that virtually everything can be measured; there even exists a measuring device known as a 'homodyne Michelson interferometer with sub-picometer resolution', so specialized that we aren't sure we want to know its use. Surely we can muster the ability to quantify the simple question: which is better for the environment, print or online publishing? The answer will not be simple, and it will depend on a variety of factors, but it will be that: an answer. We can start now by asking our suppliers what they are doing to make publishing's environmental footprint not only 'less bad', but, ideally, much, much better.

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