A Canticle for TinyURL:
Electronic Information in a Post-Apocalyptic World

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Starting around 300 BCE, the pharaohs of Egypt built a library at Alexandria, Egypt to house a growing collection of mostly Greek texts. By the time of its destruction in 391 CE by frenzied early Christians who, like the religious fanatics of today< http://online.wsj.com/article/SB10001424052702303292204577519052197927504.html?mod=googlenews_wsj >, felt threatened by anything other than their own narrow concepts of acceptable culture, it had become one of the greatest repository of human knowledge in the world.< http://www.britannica.com/EBchecked/topic/14417/Library-of-Alexandria > Its destruction was a significant milestone in the descent into the half-millennium-long dark ages of Europe, North Africa and the Middle-East.< http://www.britannica.com/EBchecked/topic/151663/Dark-Ages > For an entertaining and moving fictional representation of the time of the destruction of the Library at Alexandria, see the 2009 movie "Agora,"< http://www.imdb.com/title/tt1186830/ >, which tells the story of the famous scholar Hypatia.< http://www.britannica.com/EBchecked/topic/279463/Hypatia >

I want to jump now to an award-winning science-fiction story published in 1960: *A Canticle for Leibowitz* < http://www.amazon.com/Canticle-Leibowitz-Walter-Miller-Jr/dp/0060892994/ > by Walter M. Miller, Jr.< http://www.enotes.com/walter-m-miller-jr-salem/walter-m-miller-jr > The book opens in the 26th century CE after the mid-20th-century nuclear holocaust of this timeline has effectively destroyed technological civilization. In a rage against the scientists and technicians they view as responsible for unleashing the atomic disaster on the world, hordes of maddened zealots destroy every sign of nuclear technology, then of high technology, then of all books, then of literacy itself. Calling themselves "Simpletons" in scorn for the educated and the literate (much like today's right-wing ideologues who sneer at "elites"< http://www.youtube.com/watch?v=K4-vEwD_7Hk > when referring to anyone who seems marginally more intelligent than Sarah Palin< http://www.youtube.com/watch?v=W_J0fIF8xl0 >)(sorry, couldn't resist), these descendants of the survivors sink into a new dark age. By the 2600s, the Roman Catholic Church persists as the key organization devoted to finding, preserving, and hand-copying every remaining book – or indeed, any scrap of writing at all – that the priests, monks and acolytes can find. One of the funnier passages has a novice on a Lenten fast discovering a trove of written material from the much revered engineer Leibowitz, who is the patron figure for his religious order (and is being considered for beatification); he finds a cryptic set of words that he and others could view has having potentially great spiritual significance. It's actually a grocery-shopping list.

I've been thinking about what might happen to our own global culture if we hit another period of destruction – say, mass migrations of starving people moving from insufferably hot and dry regions of the world into more polar lands with different cultures and language. What if civilization lost electric power? Would the Internet persist? And if it didn't, what would the consequences be for the preservation of human knowledge and culture?

E-books and electronic versions of newspapers, magazines and journals are growing in popularity. In 1998, Professor Eli Noam< http://www.citi.columbia.edu/elinoam/ > of the Business School at Columbia University published a thoughtful analysis of the changing role of paper books in education. "Electronics and the Decline of Books: The Transformation of the Classroom"< http://net.educause.edu/ir/library/pdf/ffp9807.pdf >. In a summary version of the article< http://net.educause.edu/ir/library/pdf/ffp9807s.pdf >, an editor wrote, "It is characteristic of individuals, institutions, industries, and entire societies to misjudge the future. They do so by simultaneously exaggerating, belittling and fighting change…. The future of books and the university is being similarly misunderstood…. [I]nescapably, books as a physical entity eventually will become a secondary tool in academia, their role usurped by electronic media. The firms associated with books, publishers, will decline, and the role of the university will change dramatically." In the latter version, Noam suggests that there are four types of books in use in academia:

- "texts, as source material for analysis
- textbooks, for instruction
- scholarly monographs and edited volumes, for dissemination of research and broader discussion
- academic journals, also for dissemination of research."

After summarizing a number of trends pushing information into the electronic versions of such materials, Noam concludes,

> "These trends add up to a significant shift away from books in academia, the inner sanctum of the book culture…. Books are yesterday's technology. Those in academia, who love books, lament their decline. But is it not *knowledge* that we really cherish, and aren't books merely the receptacle? A new and creative medium is knocking at the door, one that should be embraced."

Steve Coffman< http://www.lssi.com/leadership.html# > of Library Systems and Services< http://www.lssi.com/index.cfm > published an extensive "paper" (the irony!) in April 2012 called "The Decline and Fall of the Library Empire."< http://www.infotoday.com/searcher/apr12/Coffman--The-Decline-and-Fall-of-the-Library-Empire.shtml > He notes that public-access computing – the availability of computer terminals at public libraries – has increased radically since the invention of the World Wide Web:

> "Today, nearly 100% of all public libraries offer public internet access. The number of public access PCs has gone from almost nothing in the early 1990s to nearly 100,000 in 2000, and by 2009 – the latest IMLS data available – that number had more than doubled to 232,505. So, during the past 20 years, public internet access has grown into a mainstay of public library service. …. [T]he evidence indicates that public internet access is a valuable service and that the public has flocked to take advantage of it. A 2010 study by the Gates Foundation showed that more than 77 million people – or nearly a third of the entire U.S. population – were using libraries to access the internet and doing it for all manner of reasons – keeping up with friends via social sites or email, doing homework, filling out job applications, researching employers, and all those other activities we engage in on the internet. Many of these people would not have been able to engage in those activities without the public internet PCs at their local public library."

Coffman points to another trend – the growing use of e-books:

> "Certainly there can be no doubt that ebooks have caught on with the general public. Amazon and Barnes & Noble have both reported more ebooks are being sold than paper books. The growth in the ebook market has been so strong, it's led some publishing pundits such as Mike Shatzkin to predict that an 80% ebook world for straight narrative text is coming in 2 to 5 years< http://www.idealoa.com/bloq > …. Whether you agree with those sorts of wild predictions or not, there is a … consensus in the publishing industry that the ebook era has definitely arrived and has already begun changing the way books are produced, sold, and read in some pretty fundamental ways….
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> [S]ome of the libraries that offer ebooks have reported large increases in circulation. For example, Seattle Public Library claims its ebook circulation jumped by 92% in 2010; New York Public says it increased 81% in 2011; and the Kansas State Library reported a tenfold increase in ebook circulation between 2006 and 2010, leading to a 700% increase in its OverDrive< http://www.overdrive.com/ > bill."

In the UK, there's evidence of growing e-book usage as well. Professor David Nichols< http://www.ucl.ac.uk/news/news-articles/1001/10010802 > of the School of Library, Archive and Information Studies, University College London and several colleagues published a survey in 2008 of "UK scholarly e-book usage…."< http://www.emeraldinsight.com/journals.htm?articleid=1733496 > involving 22,437 responses from over 120 institutions were analysed. They concluded that "e-book penetration is very strong (61.8 per cent of all students are already [2008] using them in connection with their scholarly work, as teachers or students), so the e-book revolution has already happened but clearly it has some way to go."

For a case-study of how a breakdown in availability to an electronic data source can compromise access to knowledge, consider the uniform resource locator (URL) shortening services. These tools are particularly useful for Twitter messages because of the 140 character limit; a long URL can easily exceed that limit. They are also helpful in e-mail, where long URLs may be folded (and broken) by automatic formatting in the e-mail clients.

Tinyurl reports "over a billion" abbreviated URLs and vaguely claims "billions of redirects per month."< http://tinyurl.com/ > Bitly, which is now the standard abbreviator for URLs in Twitter messages< http://techcrunch.com/2009/05/06/url-shortening-wars-twitter-ditches-tinyurl-for-bitly/ >, responded to a request for information with the following data:

- "Close to 100 million links saved per day
- Over 25 billion bitly links created thus far
- 300 million clicks on links per day [and thus around nine billion clicks per month]
- Microsoft Research estimates bitly sees 1 percent of all clicks on the Internet."

These large databases of electronic abbreviations are an example of wholly electronic data storage and access. What happens if the organization running a shortening service goes out of business or decides to terminate its service? That actually happened to trim (tr.im), which gave

up its unsuccessful competition with bitly at the end of 2009<
http://mashable.com/2009/08/09/trim-shuts-down/ >. All references using solely the tr.im
abbreviated URLs were useless – were lost – from that point on.

I think that the potential inaccessibility of abbreviated URLs if there is widespread infrastructure
disruption should make us think about the evanescence of other forms of solely-electronic
information storage. Because my wife and I live in a rural area of Vermont in the USA, we've
had a standalone emergency electrical generator since we moved to our home in July 1998; so do
our relatives and many of our friends. We can continue to access the Internet even if mains
power fails.

Just today as I write this, I learned that my brilliant octogenarian aunt's Internet service has been
unavailable for unknown reasons for the last four days and won't be restored for at least another
three days. She notes with dismay that e-mail and Web access have become integral tools for
her; being without them is a noticeable stress.

What are we going to do if the entire electrical grid fails and the servers of the Web are no longer
running? The venerable *Encyclopedia Britannica* stopped printing book versions of the great
work in 2010 after 244 years of continuous publication.<
http://money.cnn.com/2012/03/13/technology/encyclopedia-britannica-books/index.htm > So
how will children who use the electronic version of the *Encyclopedia Britannica*<
http://www.britannica.com/ > manage to complete their school essays without access to their
familiar store of information?

I don't think we're yet at the stage where complete inaccessibility of the Internet would destroy
any hope of rebuilding society, but the more information we store electronically on workstations
and servers or on devices (CD-ROMs, DVDs, Blueray discs) requiring electronic access, the
more vulnerable we will become.

What is society to do if an entire generation of people find themselves forced to return to using
paper documents – decades after the last libraries abandoned their physical books and journals?

Will electronic data storage be seen as a component of a millennium-long dark age when
scholars of the 31st century look back on their history?

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*As always, comments are most welcome. Sincere thanks to Fiona Tang for the quick response
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