

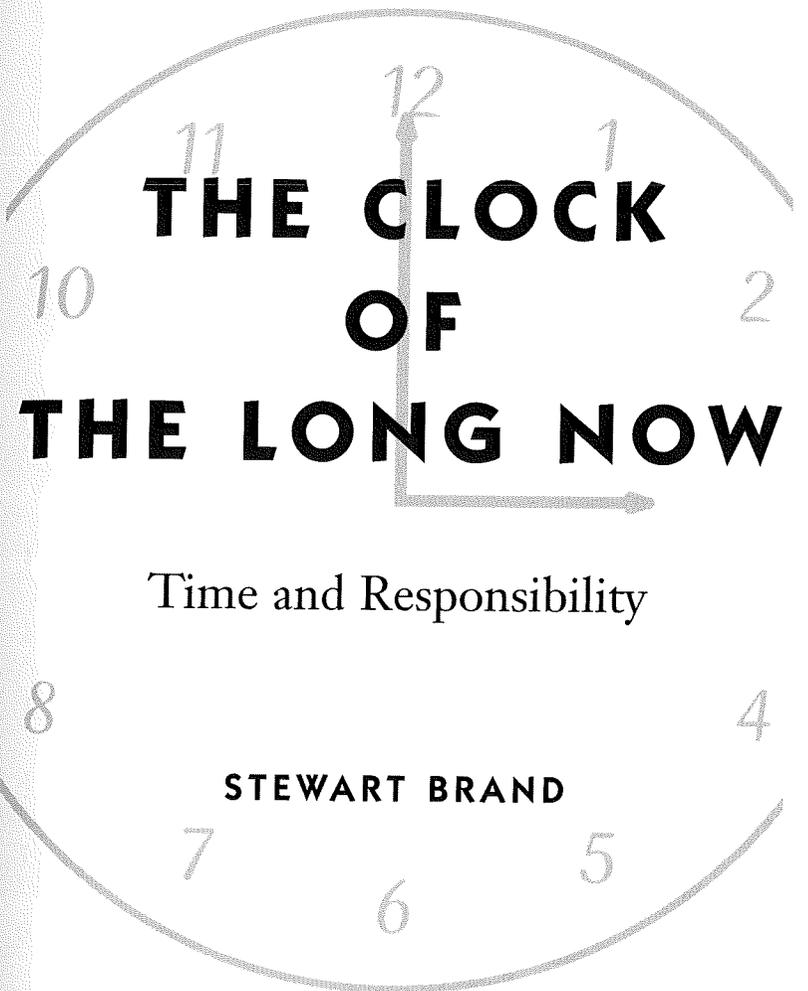
**OTHER WORKS
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Whole Earth Catalog

Two Cybernetic Frontiers

The Media Lab: Inventing the Future at MIT

How Buildings Learn: What Happens After They're Built



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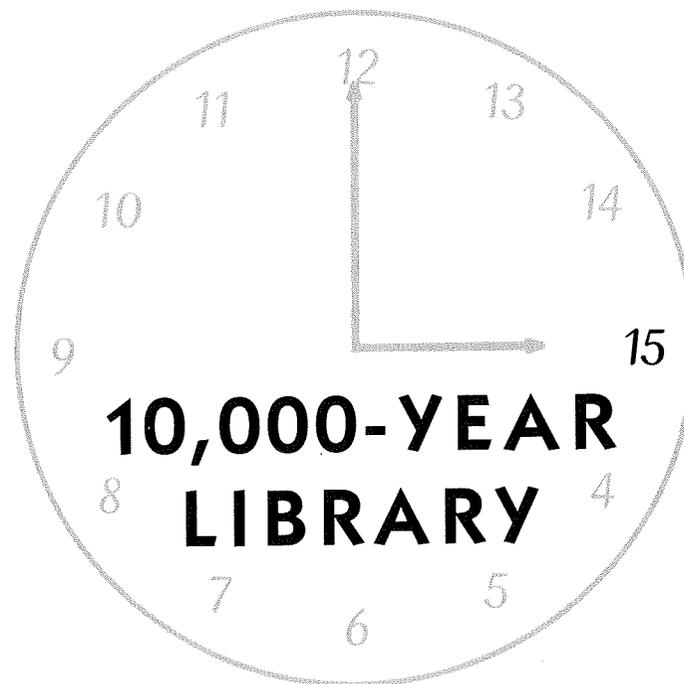
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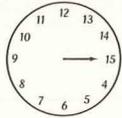
THE CLOCK OF THE LONG NOW



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term. Digital industries must shift from being the main source of society's ever-shortening attention span to becoming a reliable guarantor of long-term perspective. We'll know the shift has happened when programmers begin to anticipate the Year 10,000 problem and assign five digits instead of four to year dates. "02002," they'll write, at first frivolously, then seriously.





Taking ten thousand years of future seriously is an interesting undertaking. For instance, what on Earth would something aspiring to be a 10,000-Year Library be good for? One answer might be that it would provide, and even embody, the long view of things, where responsibility is said to reside. Another would be that such a library could conserve the information that is needed from time to time for the deep renewals of renaissance. These are traditional library justifications. The added element is that ten thousand years is an extremely long view, a period in which there are likely to be profound cataclysms requiring many-leveled renewal. Building real value into a 10,000-Year Library could be an intellectual adventure as challenging as space travel.

One very contemporary reason is to make the world safe for rapid change. A conspicuously durable Library gives assurance: *Fear not. Everything that might need to be remembered is being collected and stashed, easily accessible but out of your way. Innovate as intensely as you want. If we head down a blind alley, or get lost, we can pick up the prior path. And we're always free to mine the past for good ideas.* The U.S. Library of Congress is referred to as a "strategic information reserve" by its current head, James Billington. In an increasingly knowledge-oriented world economy that's valid. Beyond these reasons, another glimmers; I'll come back to it.

Thus far The Long Now Foundation's 10,000-Year Library has been an occasion for brainstorming. I'll float here some of the ideas that have turned up in the early pondering, looking first at long-view issues and then at deep record keeping. You're invited to add to these ideas, or even better, forge ahead and implement any that appeal to you via the Net, some existing library, or whatever else is handy. A cultural Darwinian once declared, "What has been done, thought, written, or spoken is not culture; culture is only that fraction that is remembered." Such formal remembering used to be the province strictly of elites. No longer.

In terms of stepping bodily into the long view the 10,000-Year Library should be a physical place. Fantasy immediately calls up a refuge from the present, a place of weathered stone walls and labyrinthine stacks of books, at a remote location with far horizons. It is a place for contemplative research and small, immersive conferences on topics of centenary and millennial scope. In a timeless reading room it would be wonderful to have a collection in which every volume you lay your hand on, on any subject, is superb—selected by committees of specialists of great probity and judgment. You should be able to easily buy or have personally printed a copy of any book that wins your interest.

The fantasy continues: What might be the best time-spanning, future-engaging categories to collect? History, obviously, and historiography: the history of the idea of history. Archaeology and paleontology, for the long human perspective. Environmental books, for their reach into the future. Science fiction, for the same reason, organized by date rather than author, so the browser could scan the progress of the zeitgeist about the future. (The world's best in science fiction is the Eaton Collection of some four hundred thousand volumes at the University of California Riverside Library.) Likewise, nonfiction books about the future. Science and technology books, because their subject has become a major driver of history and is likely to remain so. Demographic and epidemiological texts, for trend analysis. And sundry Long Now special interests: texts on libraries, clocks, and durable institutions. A library such as this, in token form, produced the book you are now reading.

Another image of the 10,000-Year Library is of a vast underground complex hewn out of rock—preferably a mountain, so some of the tunnels have a view. There the Library might be somewhat safe from increasing surface land values, earthquakes, erosion, cosmic rays (harmful to digital media), and the random destruction of warfare. An underground Library offers great mythic potential as well. Such places usually are secret (government) or dangerous (mines, caves), but they have no reason to be either. They can be extremely delightful—for example, the old underground limestone quarry at Les Baux, France, now a tourist attraction. In recent years underground excavation and construction have become as cheap as surface construction.



Escape from the present is also escape from relevance. The emergence of the Net is so much the dominant event of our time that an ambitious new library has no choice but to either try to get out in front of it or utterly turn away from it. I think Long Now's Library should do both: ride the shock wave front *and* its bounce. It is said that the structure of archives always mirrors the structure of power. With the Net this formula is reversed; power is now defined by the grassroots-driven Net structure of archives. Citizens can decide to cross-correlate databases of atrocity victims and military service records to track down specific government-sanctioned torturers and assassins, as Patrick Ball has done with archives in Salvador, Guatemala, and South Africa, working from his base in Washington, D.C. Citizens soon will be able to directly access government records, such as the five billion documents stored with the U.S. National Archives. Via the Net, citizens now correlate the voting records of senators and members of Congress with the sources of their campaign funding, and publicize what they find.

The structure of power used to be the structure of successful lying. In a hierarchy you can lie and make it stick, because higher authority will back up the lie and punish whistle-blowers. Lying is far more flagrant on the Net, but no one can make it stick, because anyone can challenge the lie directly and make their case with multiple links to corroborating sources. One such man, Ken McVay, undermined all the online Holocaust-denying discussion groups in this fashion, connecting them to a linked distributed archive of documentation proving that the Holocaust indeed took place.

Metcalf's Law of exponential growth of the Net is proving to be even more significant than Moore's Law of exponential growth of microchip capability. The chip is an individual's tool; the Net is society's tool. It may even become its own tool. As the science-fiction writer Vernor Vinge has suggested, the Net is supplied with so much computer power and is gaining so much massively parallel amplification of that power by its burgeoning connectivity that it might one day "wake up." Brewster Kahle, of the Internet Archive, asks, "What happens when the library of human knowledge can process what it knows and provide advice?"

At the same time Long Now is contemplating a timeless desert retreat it has to explore how it can foster on the Net the types of services monasteries provided to deurbanized Europe after the fall



of Rome and that universities provided to cities after the twelfth century. Every potential service of the Library therefore should be examined in terms of how it might develop at Net velocity and how it might be something timelessly physical—and how both forms might enhance one another.

For instance, as a way for people to take the future personally, Doug Carlston has suggested that the Library provide mail service through time. According to futurist Richard Slaughter, "It is an unusually moving thing to initiate a message which will not be read until long after one's death. It concentrates the mind effectively. In such a message, one speaks from the heart, is keenly aware of passing time and is also deeply aware of the implicit presence of future people."

Time mail could be started on the Net, but it would be more impressive as a physical experience. At a Clock site you could peruse other people's messages to the future (those that they have okayed for public reading), ponder what you want to say, to when, and perhaps to whom. Then have your message inscribed on titanium (or whatever), pay postage proportionate to the time you want to span, deposit your message in the appropriate mail slot, and watch it slide into the appropriate time capsule.

Time capsules, by the way, are a splendid and common future-oriented practice—hundreds of thousands have been buried—yet some 70 percent are completely lost track of almost immediately. The Library might offer a registry service for time capsules, remembering when they are supposed to be opened and providing maps to people currently at the site. According to Kevin Kelly, who studies time capsules, the most effective are opened periodically, enjoyed, then sealed again with new artifacts added each time.

The most impressive time capsule project I know of is headquartered in Tokyo. The Biological and Environmental Specimen Time Capsule 2001 team hopes to bury a number of large ceramic capsules sixty-five feet deep in Antarctic ice, where the temperature is -60°C . In the capsules would be "seeds, spores, human and other reproductive cells, human mother's milk, DNA, rainwater, sea water, air, and soil" kept perfectly intact for analysis by scientists in centuries to come. Once the Antarctic cache is established, the team would like to place capsules on the Moon, where the temperature is -230°C . and there is neither air nor moisture to foster rot.



(Come to think of it, if human beings do become a spacefaring species, Earth's Moon might be an ideal eventual location for the 10,000-Year Library. Over that time frame humanity's main story would be of global convergence followed by a massive diaspora into space. The diaspora's point of origin would be a prime candidate for record keeping, and the Moon offers a stable, durable site, easily accessible from space, with a good view of grandmother Earth.)

Even in the short term the Library could provide a number of time-release services. Secrets that are meant to be kept for a certain time, or until certain people have died, could be held physically or cryptographically sequestered until their time is ripe. Property deeds, contracts, wills, directions to caches could be securely stashed with appropriate wake-up directions built in. Danny Hillis points out that "Search for Extra-Terrestrial Intelligence programs need this. By the time any sort of extra-terrestrial life is likely to answer, we will have forgotten what we asked."

The Library could offer personalized I-Told-You-So! services. Register your prediction, your hunch, your wild scheme, your strong argument about the future course of events, set the wake-up date, pay the fee, and relax, knowing that history will be given irrefutable notice of how right you were. A sufficient mass of such material over time could give researchers data for insight into the nature of future telling and its progress, if any, over time.

The same dynamic is behind the idea of a Responsibility Record. Suppose we wanted to improve the quality of decisions that have long-term consequences. What would make decision makers feel accountable to posterity as well as to their present constituents? What would shift the terms of debate from the immediate consequences to the delayed consequences, where the real impact is? It might help to have the debate put on the record in a way that invites serious review.

One side of such a debate could file (for a fee) its arguments, facts, media reports, major players, and predictions with the Library's Responsibility Record, along with desired times in the future for the record to "wake up" for review. The Library would then of course contact the opposition to see if they would like to do the same. The record is public; each side could attach corrections and rebuttals to the other side's file.



Years later, at the wake-up times, those living with the consequences of the decision will be able to see what both sides registered, will compare the two versions with what actually happened in the world, will assign blame and credit accordingly, and will by the way notice whether the terms of the original debate had anything whatever to do with what actually happened. This is where the real payoff lies. By harnessing the power of contention, the Library can accumulate detailed records of countless sequences of debate-decision-consequence, on a growing range of subjects, spanning ever-longer periods of time.

A well-managed Responsibility Record would be both trove and warning. The warning is to policy makers and issue debaters that they will be held accountable by posterity. The trove is for delvers in lessons to ponder and explore ever-better terms of debate for issues with long-term consequences, and to frame current debates in the context of relevant past debates. We can stop reinventing the square wheel.

The Responsibility Record fosters slow, direct-feedback loops in policy. This is a new and perhaps crucial service, because up to now civilization's feedback loops have been either direct but quick (win the election), or slow but indirect (suffer a gradually degraded environment). The urgent always had a louder, clearer voice than the background rumble of the important. The Responsibility Record doesn't try to change the voices; all it does is retune our hearing.

Another long-view service has been suggested by Esther Dyson. Every so often the public is gripped by a great mystery. Who kidnaped the Lindbergh baby? Who was behind the killing of President Kennedy? Did Dr. Sam Sheppard murder his wife? Who was the Unabomber? Time has solved two of these. Math instructor Ted Kaczynski was the Unabomber; and the convicted Dr. Sheppard was innocent back in 01954.* DNA analysis forty-four years later proved that a window washer, Richard Eberling, not only killed Mrs. Sheppard but raped her first (something never mentioned in the celebrated trial). The Long Now Library could preserve rich archives of such mysteries so that they can be relived in

*Just to try out the 10,000-year perspective, the remainder of this book employs the five-figure year dates proposed in the previous chapter.



light of what eventually is discovered. As new mysteries emerge, people can expect the Library to stay on the case. They will be able to experience their contemporary mysteries simultaneously in the present and in terms of how they might look in the future, when they have been solved. The ability to live both in the present and in a handful of imagined but uncertain futures is the basic skill of foresight, planning, and responsibility. It is worth encouraging.

Just as new information can be applied to old situations, uninvited but important old information might be applied to new situations. A few centuries from now the Library might send a message: *To the government of the region formerly known as New Mexico. Upon periodic review of the long-term hazards file for your area, it has been determined that a very large—an extremely large—quantity of radioactive waste was buried in salt structures a short distance east of what used to be called Carlsbad Caverns. In the event that this comes as news to you, we can furnish the exact location of this hazard, which is expected to be potentially harmful for another nine thousand years. Your next notification will be delivered three hundred years from now.*

Better still might be messages in time bottles. Hide forest-losing statistics and reforestry advice inside virgin forests. Bury information on global warming inside glaciers. Seed uncleared minefields with data on who exactly planted the mines.

The Library should specialize in trends too slow to notice but that gradually dominate everything as they accumulate: these are the genuine megatrends in economics, demographics, and environmental data. Our civilization is skilled at focusing on content, Esther Dyson points out, but we have not developed good peripheral vision for gradual shifts in context. The Library should take an active role in supporting extremely long-term scientific studies (the subject of an upcoming chapter).

One of the best ideas I have heard for a library of the future is not a library at all, but a museum. Let Richard Benson, dean of the Yale School of Art, make the case:

Embed the Clock, as a centerpiece, in a new museum of the history of technology. If technology is to be the future of the living world, then we have to admit that it is at its starting block. We are at the Cambrian explosion of technology, and we are at the perfect point in time to gather the fossils as they



are being made and discarded. The point at which technology really took off is with the invention of the heat engine, and the bits and pieces of this brief period are still around to be preserved. Engines, locomotives, cars, planes and all the pieces of the great transportation revolution are also still around. The brand new electronic revolution is taking place in our midst, and we could easily gather up the detritus of this great step's beginning. There are unthinkable things ready to happen, and they will occur at a dizzying pace; we could build an institution around the recording of these changes. The very nature of the institution could be to persist over time so the record is made as complete as possible. We also are living in a fat time, with great wealth and stability, and it would seem reasonable that those making fortunes with technology would be interested in preserving a record of their achievements. Without institutional and financial long-term support, the Clock will disappear as quickly as the small group who are trying to make it.

Such a museum could, if necessary, be not just a collection of curiosities but a template for renewal. When civilizations truly crash, no one at the time can imagine the depth of the fall, nor how labored and long the revival, if it ever happens. After Rome fell, "Europe went unwashed for a thousand years." Cities emptied; literacy vanished. All the Roman achievements of engineering, culture, and government simply ceased to be. Population in some areas dropped by nine-tenths. Even with the heroic continuity of the Catholic Church, the skein of culture was reduced to fragile wisps: Only one copy of Lucretius made it through the Dark Ages, Only one copy of five books of Livy, one copy of nine plays of Euripides, one copy of Tacitus, one copy of *Beowulf*.

Of the fifteen to twenty thousand distinct languages once spoken two-thirds are extinct, and the pace of loss is increasing. "The death of a language," writes George Steiner, "be it whispered by the merest handful on some parcel of condemned ground, is the death of a world."

Civilization now is global. It is ever more tightly linked and ever more leveraged out over the abyss on an elaborate superstructure of highly sophisticated technology, every part of which de-



depends on the success of every other part. All this may make it more robust against catastrophe, or more frail, we don't know yet. What we do know is that a global collapse cannot count on some other civilization coming to the rescue, since by then there will be no other. It is strange to contemplate, except in light of thousands of years and the demise of twenty-some previous civilizations.

Perhaps the 10,000-Year Library should be thought of as an insurance provider. It offers detailed risk assessment of the chances civilization is taking (which might be enlightening in its own right) and promises resources for recovery if, God forbid (as insurance agents say), the worst should happen.

The scientist James Lovelock, best known for his Gaia theory of life-mediated regulation of the atmosphere, has proposed compiling a start-up manual for civilization, beginning with how to make fire, moving on through all of science and technology, from subjects such as ancient genetic design (domesticating plants and animals by selective breeding) to current genetic design (cloning). "Who would guard such a book?" Lovelock asks. "A book of science written with authority and as splendid a read as Tyndale's Bible might need no guardians. It would earn the respect needed to ensure it a place in every home, school, library, and place of worship. It would then be on hand whatever happened."

Lovelock worries about science skills being lost because they have become so widely scattered into countless narrow specialties. His civilization primer would be the great cross-disciplinary reference work. Doug Carlston lists other categories of endangered information: "information that was important to many but held by few, old information (Dead Sea Scrolls), restricted information (Stasi files), information of importance over long periods of time (gene structures, seismic records, weather, seeds!), information held largely in highly degradable form (Technicolor movies)."

What do historians want preserved? I asked William McNeill, author of *The Rise of the West* and *Plagues and Peoples*, about the kinds of things his fellow historians wish had been saved from the past. Well, he said, there was the census of the entire Roman Empire, which the parents of Jesus were avoiding. Caesar delivered the document to the Roman Senate, and that's all we know of its priceless contents. Then, there are delicate points in history, like when Alexander the Great failed in India and headed back. Some histo-



rians think that he was planning to conquer North Africa, which would have made the Mediterranean an Alexandrian lake and changed history. Some personal diaries of his generals would be helpful to have.

The problem everyone has is that *you never know* what will be treasured later. When we look at old magazines, the ads are far more fascinating and informative than the articles. The U.S. Weather Service receives considerable income from selling old weather reports. To whom? To lawyers, who want to know if it was raining on the night in question. The BBC, on a housecleaning binge a few years back, tossed out some of its video archives considered trivial and has been gnashing its teeth over that cultural loss ever since.

The largest and heaviest book in the world is inscribed on 14,300 large stone tablets concealed in caves near the Yunju monastery in Beijing Province, China. In a time of book burnings, 00605 C.E., a monk set about preserving the Buddhist scriptures on stone. The work continued for a thousand years, and then the entire trove was hidden in 01644 C.E. The hoard is indeed valuable for studying the history of Buddhist thought, but probably we would value the stones more if the monks had simply recorded the weather and what they were eating. Better still would have been a reverently preserved sequential archive of dried monk poop, which would yield no end of data on diet, agriculture, climate, health, and racial and family lineage. You never know what people will want preserved.

One of the great instruments of civilization is the idea of the canon: the select set of items deemed to represent the best of a genre and the main line of progress and transmission from generation to generation in that genre. A primary function of universities is the care and feeding of various canons—mainly literature, the arts, science, and the named academic disciplines. Other canons are strangely untended, such as technology, agriculture, business, and such nonacademic pursuits as gardening, furniture design, currencies, and pets.

One canon I would like to see established is that of the great textbooks. Just knowing the current list—*The Cell* in microbiology, *The Art of Computer Programming*, Renfrew's *Archaeology*—would enable anyone to pursue top-level education on their own. All the best textbooks in combination would nearly add up to Lovelock's



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primer of civilization. Study of the evolution of the most influential textbooks over time would yield peerless insight into intellectual history. Comparative analysis of what makes the best contemporary textbooks so good might lead to even better textbooks being written.

Do such ideas justify setting in motion the building of a 10,000-Year Library? By themselves, perhaps not. The ultimate reason for initiating something ambitious is not to fulfill certain notions but to find out what surprises might emerge. The most remarkable results almost certainly cannot be anticipated. What would the existence of something thought of as a 10,000-Year Library bring into the world? "Boiling rocks" is what the novelist and provocateur Ken Kesey calls this kind of research. "If you don't boil rocks and drink the water, how do you know it won't make you drunk?"

