



The Appendix

Out |
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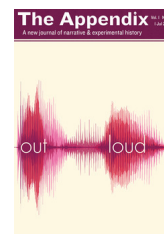
INTERVIEW WITH ALEXANDER ROSE OF THE LONG NOW FOUNDATION: 10,000 YEARS CHIMING

¹ In 1968, Tom Wolfe recounted the early “acid tests” led by Ken Kesey and [Stewart Brand](#) in the San Francisco Bay area, including one that attempted to evoke “the Humanoid Radio ... the idea was to try to hit that beam and that mode that would enable you to communicate with beings on other planets, other galaxies.” Decades later, an organization co-founded by Brand is trying to imagine how the present might communicate with another class of distant beings: the residents of the far future.

For the past fifteen years, [The Long Now Foundation](#) has been working toward the construction of a “Clock of the Long Now” designed to persist for at least ten thousand years and encourage long-term thinking today. The aim is to create a device that will outlast the present civilization and serve as a bridge to the societies that come after ours. The clock is both a musical instrument—one designed to produce unique melodies for millennia—and a symbol of the human impulse to communicate. It is also a marvelous piece of technology, currently in development in California and Washington and set for installation at a remote site in the West Texas desert owned by the billionaire Jeff Bezos. In March of 2013, Appendix executive editor Christopher Heaney spoke with the executive director of The Long Now Foundation, [Alexander Rose](#), about the clock’s past, present, and future.

Christopher Heaney is an editor and co-founder of The Appendix, a PhD candidate in history at the University of Texas at Austin, and the author of *Cradle of Gold*.

From the Issue



Out Loud
Issue 1.3—July 2013





Alexander Rose.
The Long Now Foundation

Christopher Heaney: So what does the ‘Long Now’ mean and where did that idea come from?

Alexander Rose: The term the ‘Long Now’ was coined for us by someone who became one of the founding board members, the musician and artist [Brian Eno](#). He had grown up in England and he had always understood the term ‘now’ to mean ‘the time that we are in,’ almost ‘the last and next ten years.’ And when he moved to New York, he not only realized that when people said ‘here,’ they meant basically the walls they were between, not the larger city or neighborhood they were in. And when they said ‘now’ they also meant ‘the five minutes they are in,’ not the larger time they are in. So he coined this term ‘Long Now’ in contrast to the ‘Short Now’ that he was experiencing in New York.

- ⁵ We stretched that out even further to basically be the human civilizational moment: the last Ice Age roughly retreated around ten thousand years ago and agriculture started in lots of places around the world. What we would call ‘civilization’ got its beginnings about ten thousand years ago, and so we envision ourselves at the middle of this story. The last ten thousand years and the next ten thousand years becomes the ‘Long Now.’

CH: And why is it important to conceive of the Long Now, as a mental space to get into as we go forward?

AR: There was a lot of discussion early on about what the time scale should be and why different time scales matter. If you look at the astronomic time scales of billions of years, then the human experience—and almost the earthly experience—becomes so trivial that there’s really no acting within that space in any meaningful way. And even if you look at geological time, you have that same problem of millions of years. But if you look at the last ten thousand years and

the next ten thousand years, that's four hundred generations backward and four hundred generations forward (at twenty-five years a generation anyway). The idea there is that [if] you're keeping that past and that future in mind, you're going to be doing things that are informed by the past and preserving options for the future. Whereas if you're only acting for yourself or your current generation or even your current year or quarter, you can take a lot of options away from the next people that come along.

So one of the fundamental things we have learned about thinking about time in this way is that a lot of it is about preserving options for future generations. For instance if you were to cut down all the old growth redwoods in the Pacific Northwest, that option is now not available to the next generation.

CH: There's a story that I know that people at The Long Now Foundation talk a lot about that seems really useful; it's the one that [Danny Hillis](#) brought up when he first introduced his idea of the ten thousand-year clock about New College at Oxford.

¹⁰ **AR:** Yeah, the story went, [that] when New College was built in the [fourteenth century], it was the 'new college' at the time. It wasn't until 500 years later in the 1800s when these big oak beams that went across the main dining hall were inspected and people realized that they'd become a bit rotted and infested with beetles. And they didn't quite know what to do, because you couldn't buy lumber like this in Europe anymore: the commercial forests had all been harvested.

It wasn't until they spoke to the school forester who said "Oh, yeah, we have the trees that you planted." And it turned out that when the school was built, there was also a grove of oak trees that had been planted that 500 years later could be harvested for exactly that purpose. And when Danny heard this—Danny's background was in building supercomputers, the fastest computers in the world—he realized that this type of thinking was clearly not going on in the world that he was living in. And as he talked to the group that eventually became the founding board, people like Stewart Brand and Kevin Kelly from *Wired* magazine and futurists like Paul Saffo and Peter Schwartz, that they were not seeing this kind of discussion happening either: what are the kind of things you do need to pay attention to over the long span, what kind of problems would you solve if you had a hundred years or a thousand years—problems that basically are off the table if you have two years or a quarter to solve them?

CH: What is the clock, and how did it come to be?

AR: Well the Clock of the Long Now was an idea of Danny Hillis and it's really the thing that sparked this conversation. He sent out an essay to the group that I mentioned who became this founding board back in 1995 and said that he wanted to build the slowest computer in the world instead of the fastest computer in the world. It would be a millennial clock and it would tick every year and bong once a century and the cuckoo would come out every

millennium: this kind of poetic version of a large monument-scale icon to long-term thinking that people would travel to and visit and be inspired that there could be projects that take place over a millennial scale.

So that was the inception of that clock idea. After a couple years of discussion I came across the project through Stewart Brand and was introduced to Danny Hillis, and he and I started working on building the first prototype of that clock. That one's about eight feet tall and was finished in 1999. Since that time we've made several other prototypes, and starting in 2005 we started working on the monument-scale version in West Texas, which is now under construction. We're building an underground space for it as well as building the machinery that's going to be shipped out there and installed in the future.



Alexander Rose working on a prototype of the Clock of the Long Now.
The Long Now Foundation

- 15 **CH:** According to the Foundation site you've drilled a 500 foot tall shaft down into the earth where the clock itself is going to be and you've started building the steps through which visitors can climb up the chamber towards the clock's gears.

AR: We haven't started the steps yet but we've built this robot that can cut them. We've also started building the machinery itself. A lot of the major components of the clock are now in production and some of them are getting to be complete.

CH: Tell me a little about that design process. It's very intentionally not an electrical device; it's a mechanical one. Why did you go in that design direction, towards gears and these very durable pieces of machinery?

AR: The first reason is that there's certain criteria that Danny started judging all clocks and machines against that might be applicable; those criteria included longevity, maintainability, transparency, scalability. As you look at other clocks, even electronic ones and atomic clocks and all these things, what you realize is you have to design this thing to be lost or neglected and then found by people

you have to design this thing to be lost or neglected and then found by people who may or may not understand it and may or may not have the same technology level: could be vastly greater, could be vastly lower. And you want it to be understood and maintained by all of those people, as broad a version of those people as you can imagine. So when you start doing that, electronics just falls right out of the loop right away. Because if you find an electronic clock and the screen is blank, it's really hard to even understand it's a clock, [and even harder] if it has circuitry and silicon chips at a microscopic scale.

The other reason is that we've come to assume that magic things can happen with electronics, and it's hard to be impressed by them anymore. So by making a large machine that's architectural in its mechanics, that you can walk through, [we're fulfilling] the point of this project [which] is really to inspire people and to change how they think about time. The other thing you get out of larger size is that it helps it be maintained with a very low technology. The larger the size, the lower the tolerances, the easier it is to use things of low technology manufacture like sand-casting, which is the oldest way of making metal.

- ²⁰ So those are all the main reasons. And the other thing [is] that as you look at that prototype and some of the other machines that we've continued to build, you hit on probably the most difficult problem that we work on, which is aesthetics and experience design. What is the aesthetic of a thing—what do you use as your aesthetic for something that's supposed to last for ten thousand years, and not only has to last but has to be appealing to a large number of people? Aesthetics go in and out of fashion. How to choose the way that something is supposed to look so that it remains engaging for thousands of years is probably the thing we struggle with the most.

CH: It's trying to figure out what will appeal to people ten thousand years from now, not having them dismiss or destroy it.

AR: That's right, you want it to be cool enough that people want to care about it; obviously people destroying it is something that we can't stop, so we want to make it something that they purposefully want to save. So you look back through history at things that have survived and look at the reasons why. In some cases it's because they were just lost and found by the right people, in some cases it's because they had an ideology that survived alongside them like an institution, like Shinto shrines in Japan.

In some cases it's because the ideology was very much against them. The world is rife with things that we have lost because they were associated with the wrong religion, or the next dynasty's power, or something like that. All the way up to modern times when we saw the [Buddhas of Bamiyan](#) destroyed by the Taliban in Afghanistan, with a lot of effort to blast them out of these giant cliffs that they were carved into. And it's hard to imagine a more innocuous symbol of a religion than Buddha, but they thought it was threatening enough to put a lot of time and effort toward destroying them. So that's the kind of thing that we really struggle with in terms of, we do have this ideology in terms of long-term thinking, but we really don't want that to become an ideology that becomes

thinking, but we really don't want that to become an ideology that becomes threatening in any way.

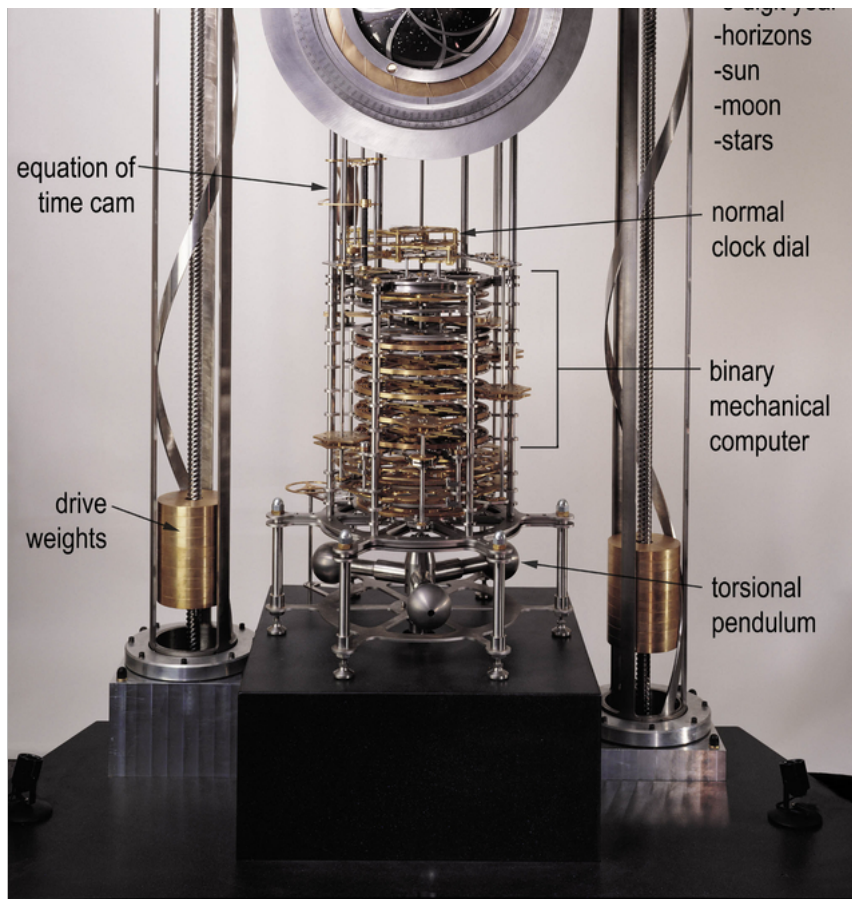
CH: One of the ways the clock fits into this particular issue of *The Appendix* is that we're thinking about music and sound, and how they travel through time. It strikes me that you're building a clock, but one could also say that you're aspiring to build one of the world's oldest musical instruments in the future. How does sound play into the design of the clock? Why were those chimes an important process of its design rather than, say, a cuckoo?

²⁵ **AR:** Right: as I mentioned, there was that early poetic version of the clock and that's evolved a bit. But one of the things the clock has is this chime system, and its ten bells that are mechanically rung in a different sequence each day for ten thousand years—or they can be: the bells only ring and the dials only update when people visit the clock.

So the clock is always keeping track of time, but it only shows the time and rings the bells when people are there. That allows for some interaction for those people as well as solving an engineering problem for us of wasting all this power when no one is there. That algorithm of how to ring ten bells in a different sequence for ten thousand years was designed by Danny Hillis. He and I and our engineers and Brian Eno have been working on what exactly those bells could be, how we would ring them, what they would sound like, and Brian Eno even released an album of his first experiments of using that algorithm as well as virtual-designed bell systems. That album's called [*January 07003: Bell Studies for the Clock of the Long Now*](#) (2003) which was a day that he thought had a particularly nice bell ringing combination: a day that's five thousand years in the future.

We continue to do research. The bells and the music are going to be one of the last things that we finalize. We're building a chime generator. But for the final sounds, we're waiting until the rest of the site is excavated so we can test the acoustics of the space so they can inform what kind of resonances we want in the bells. As you may know, in churches when they tune bells and organs, they often tune them to the space so they have this frequency that actually uses the space as the largest part of the reverberation device. So we want to do a similar thing with these bells. Brian Eno's already been to the site when we first started doing some of the excavation and did some first tests trying to find its natural frequencies, but we continue to excavate and that's going to change that. So that's a continuing research project.





A prototype of the clock.
The Long Now Foundation

CH: That's really exciting. There is a little bit of a difference, though, from bells in churches, say, because bells in churches do count out time, but also they have the older cultural meaning of 'now is the time for worship' or signaling particular events. Is the purpose of the bells on the site to mark time, or is it simply to inspire a respect for beauty and appeal to the aesthetic side of the imagined visitor? What are they for?

AR: Well, it's an interesting question. I think the way we have designed them, the answer to your question is that they basically celebrate that a visitor has come and wound the clock. They do that by giving them a unique ringing sequence every day that they might arrive and wind the clock. So that is certainly different, in a sense that's marking time but that's also basically celebrating that they're there.

³⁰ Since this clock is quietly ticking—it has a very small number of moving parts that keep going whether or not people are there and it's powered by the temperature difference of day to night—it's always in this hibernation mode until people are there and they wind up and update the dials. The clock knows what time it is, but it doesn't tell you until you wind it, and it's ready to ring a series of bells but it doesn't do it unless you're there to wind it. So it's trying to tell you that it's thankful you arrived and paid attention to it.

CH: It assumes that we still understand how to wind clocks. At *The Appendix*

we've been talking about the Voyager Golden Record: how do you educate the future visitor who might not be part of any recognizable civilization? How are you imagining that induction process into the site?

AR: These are the things that we struggle with the most: the aesthetics, the experience design. What shape of handle do you make for a person ten thousand years from now? Are their hands even going to look like ours?

If we look back in time, people's hands looked enough like ours and they were enough like our body shape that we feel like we have a pretty good grasp on that, but I think that's a good question: what values they might have, and what would intrigue them ten thousand years from now. We've made some assumptions. For instance, [we've assumed] that if we make a capstan—style winder—a thing that you walk around and has handles on it—in the path that it takes to visit the clock, that people are going to be curious enough to go ahead and wind it. It's just an assumption of human curiosity that we feel we're going to count on.

Usually the problem is that people over-wind it or do it too fast or too much, in a sense. We have made the assumption that people will want to do something with a handle if we give it to them. So we've made it really obvious in the sense that it's right in your way, and we've also made the assumption that they would want to do it.

³⁵ **CH:** Right, it's like a scene from a pulp adventure story: you come upon a temple with a handle and the first thing you do is grab the handle and set all the mechanisms in motion.

³⁶ You brought up the idea of Shinto temples: how people have been willing to transmit and update both architecture and the ideas alongside architecture. There's a continuity of the organization as well. Is Long Now something that might exist for hundreds of years alongside the clock?

AR: Japan has one of the longest-standing wooden structures in the world and up until recently it was actually one of the tallest wooden structures in the world. It's a sixth-century temple that stayed up for fourteen hundred years because it's had continual maintenance and people making sure the roof is over it. Another Shinto temple—probably the most important one in Japan as I understand it—is the one at Ise, and that's a very small temple that only the emperor was allowed in and it has been rebuilt at an alternating site, one next to another, every twenty years for at least a thousand years, and there's some records that point to it being much longer than that.

So those are two models: one is that you build a thing and you maintain it; the other is a baton-passing model where you rebuild the thing every twenty years in very ephemeral materials like rice paper and thatch and that twenty-year time span allows a master to teach the apprentice and the next time that person is the master and teaching the apprentice and you have this generational hand-off. And I suspect that act of rebuilding is why Shinto has lasted through the

can't help but suspect that a lot of rebuilding is going to come through the coming-in of Buddhism and later Christianity. Most everyone in Japan is still Shinto in some way, and the other religions have added onto that. And I suspect there's something in that ritual, the rebuilding, the once-in-a-generation 'why are we doing this,' that helps that. It's an interesting lesson to learn both in ways of doing maintenance and in ways of reminding a culture why they're doing maintenance.

CH: The Long Now Foundation has been able to do what it does by appealing to the public, by appealing to people who are inspired by its message to contribute and get involved. Do you imagine The Long Now Foundation taking on apprentices at any moment, or is this something that at least in the immediate future is going to have a much smaller group maintaining it?

⁴⁰ **AR:** Well, right now we're building it, so we're not interviewing the winders yet. [Laughter]. But we really hope that it's engaging enough that people want to do it, and we've designed it to not be wound for long periods of time. So I think there's a question of how much security we put around it and things like that, but fundamentally we really want it to be this self-motivating sort of thing. We'll see how that starts to play out at the beginning of its life and going forward.

CH: If I understand the chronology correctly, it's partly in Texas because Jeff Bezos of Amazon got involved and had a terrific site for it on his property. Is there any question of open access?

AR: It's specifically [been] stated from the beginning that it's for people to come visit.

CH: Something that came up in a talk you gave that interested me was the 'ablative layer' of a monument or site or object. How do you make sure that people don't just maintain it, but that if looting does happen, it doesn't affect the workings of the clock?

AR: That ablative layer technique is a curious one. We haven't designed anything for that specifically yet, but we're looking at that as an idea and luckily it's something that we can add in at some later point. But the [concept of] sacrificial things as protective mechanisms goes all the way into the biological world where a lizard will allow its tail to be broken off when the bird attacks it and it grows a new one and it doesn't hurt the lizard. Well, I'm sure it hurts to some degree, but they stay alive and they remain a lizard.

⁴⁵ Similarly, the Great Pyramids had these great casing stones as well as the gold inside, all of which had been looted over the years, but we still have their basic pyramid-ness. And another example is the Taj Mahal, which was covered in jewels; when that was looted, people spent a lot of time prying those jewels out of the walls rather than burning the whole thing to the ground.

These architectural examples have been accidental methodologies. And in the biology world they've evolved mechanisms. We haven't made any decisions as

to whether we're going to line the chambers with gold or jewels as a way to make people think that they've stolen the value even as the clock remains. But something like that is certainly possible.

CH: For my final question I wanted to ask you to imagine ten thousand years from now: there's a future group of human explorers, maybe from an African empire going to the lost forgotten continent of North America. After they catalog the cities and other sites, they find this clock in the mountains of Texas last. Do you think it's remotely possible to imagine how they'll see it and what they'll do with it? What do you want it to say to future civilizations?

AR: There's certainly no way for us to know how they'll interpret it. But I think that the exercise to answer this question is if we dug into this mountain and we found the clock already there, ticking away, what do we wish we had found? And that's basically the fundamental design question. What we hope we find there is that it's working and understandable by us. And the message that we hope is conveyed is 'the people before us cared.' If we can achieve that, that the people in the future feel as though we actually cared about them, that's the most we can likely hope for.

CH: And in a more immediate sense, we know it's a message for people today to change their way of thinking.

⁵⁰ **AR:** Right. You can certainly dismiss that it might work; you can say that it might get looted in the years to come; you can say that it's a waste of resources, any of these things. But even in thinking about it at that level, you're thinking ten thousand years in advance of right now, which means that it's already achieving its goal. It's as much a mechanism for the present as it is for the future.

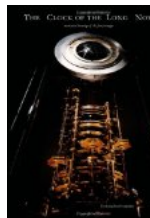
Recommended Reading



Clock Of The Long Now: Time And Responsibility: The Ideas Behind The World's Slowest Computer

By Stewart Brand

Stewart Brand's book about the Clock of the Long Now, as well as a proposed underground labyrinth of books.



Clock of the Long Now: Prototype One Mechanical Drawings

By Alexander Rose

A 2010 book of Alexander Rose's mechanical drawings for the clock.



January 07003: Bell Studies for The Clock of The Long Now

By Brian Eno

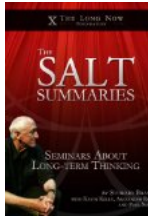
A suite of music designed for the clock by legendary musician, composer and

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18. "Nancy Grows Up," the Medi Age, and the Historian's Craft (forthcoming)
19. Rules of the Tribe: Hardcore Punks and Hair Metal in the



A suite of music designed for the clock by legendary musician, composer and producer Brian Eno.



The Salt Summaries: Seminars about Long-Term Thinking

By Stewart Brand et al

Condensed ideas about long-term thinking summarized by Stewart Brand (with Kevin Kelly, Alexander Rose and Paul Saffo) and a forward by Brian Eno.

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Elsewhere in the Issue



Solitude and Sandaya: The Strange History of Pianos in Burma

The Descent of the Lyre

In 2007 author Will Buckingham traveled Bulgaria with a guitar, a crude painted icon of his own making, and the desire to write a novel about the imagined saint his icon portrayed: a guitarist with bandaged hands. We share an excerpt from the book that trip birthed—*The Descent of the Lyre*, a retelling of the Orpheus myth in early nineteenth-century Europe.

“To Wait Together upon the Lord in Pure Silence”

If hearing the past hard, harder still is listening to its silences. Rachel Ozanne takes us inside the silent worship of early American Quakers, and their suspicion of the noisy worship of Baptists and Methodists.

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