DEPT. OF TECHNOLOGY

REMEMBER THIS?

A project to record everything we do in life.

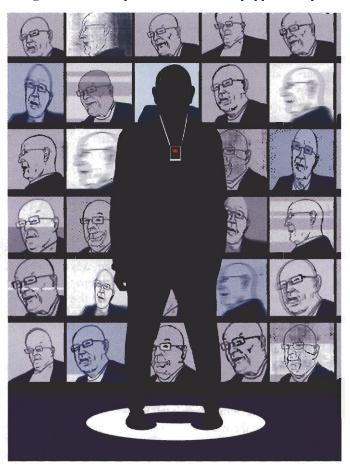
BY ALEC WILKINSON

ctober arrived in 1998, and Gordon Bell went paperless, after hearing from a professor at Carnegie Mellon who was engaged in a project to scan a million books and post them online. The professor, a friend of Bell's named Raj Reddy, had called to ask if he could scan and post Bell's books, including one on how to start a high-

tech business. Bell said, "Of course." This, hy the way, is the Gordon Bell, aged seventy-two, of Microsoft, who has been described as "the Frank Lloyd Wright of computers"; who, at the Digital Equipment Corporation, was among the first engineers to fashion eomputers into a network; who led the National Science Foundation effort to link the world's supercomputers—the Internet. The Gordon Bell, incidentally, who believes that one day houses will have no windows, so it won't matter where they are—screens on the walls will display whatever we want to look at. (Bell would like the screens in his dining room to display the view from a window of the Orient Express; he would also like to hear the train's sound effects.) The Gordon Bell who, owing to Reddy's call, and by means of custom programs and gadgets, now

collects the daily minutiae of his life so emphatically that he owns the most extensive and unwieldy personal archive of its kind in the world.

The first epiphany of three in the making of Bell's archive occurred when Bell realized that if Reddy was scanning books into a computer, Bell could scan all the papers in his file cabinets and in the boxes crowding his garage, in California, and then throw them away. He could also scan his scrapbooks and photographs, the business cards he has saved, the posters on his walls, and his many commemorative T-shirts. It was too late to include his collections of razor blades, postcards, balsa-wood model airplanes, and salt and pepper



Gordon Bell's personal archive is the most extensive of its kind.

shakers—those had been dispersed in childhood—but not his interesting coffee mugs, which were first photographed, or the manuals for his appliances, "because you can never find the damn things," Bell says.

The scanning took years, and it continues. Bell doesn't do the work himself—he hired Vicki Rozycki, a pleasant,

determined, and resourceful woman, for the task. "There was a big, big file cahinet and bankers boxes that were visually a little overwhelming," Rozycki says. "But it wasn't like there was this Sisyphus guy pushing the rock up the hill."

Bell's archive now also contains a hundred and twenty-two thousand e-mails; fifty-eight thousand photographs; thousands of recordings of phone calls he has made; every Web page he has visited and instant-messaging exchange he has conducted since 2003; all the activity of his desktop (which windows, for example, he has opened); eight hundred pages of health records, including information on the life of the battery in his pacemaker; and a sprawling category he describes as

"ephemera," which contains such things as books he has written and books from his library; the labels of bottles of wine he has enjoyed; and the record of a bicycle trip through Burgundy, where he tried to eat in as many starred restaurants as he could (he averaged 2.2 stars per meal-"I do a lot of measuring," he says).

In 2001, Bell published an article in a technical journal to announce that he had finished "the intellectual part" of going paperless. Then he had his second epiphany. He recalled a piece, published in The Atlantic in July, 1945, by Vannevar Bush, called "As We May Think." Bush, who had been the head of the Office of Scientific Research and Development during the Second World War, speculated about what work scientists would take up, now that they no longer had to invent weapons. Among other

things, he decided that innovations in photography would produce smaller cameras. "The camera hound of the future wears on his forehead a lump a little larger than a walnut," he wrote. He or she could take photographs all day. 3 The problem would be what to do with $\frac{2}{3}$ them. "Consider a future device for individual use, which is a sort of mecha- 🗟

nized private file and library," Bush continued. "It needs a name, and, to coin one at random, 'memex' will do." Memex stood for "memory extender."

A memex would consist of a desk that had "slanting translucent screens, on which material can be projected for convenient reading." Anything entered into the memex would be saved on microfilm. Bush thought that "if the user inserted 5000 pages of material a day it would take him hundreds of years to fill the repository, so he can be profligate and enter material freely."

By means of a code, a memex user could retrieve a book. He could project a book on one screen and a photograph, say, on another. When he found a congenial collection of material, a trail, he could join it together and save it, or add it to another trail—anticipating both Wikipedia and Google.

Bell, mindful of Bush's piece—and drawing on his own "Law of Computer Classes," which he wrote in 1972, and which predicted that a new class of computers would emerge roughly every ten years—realized that by 2007 the capacities of disk drives would likely be such (and they are) that even someone trying hard to fill one up would not be able to.

Having spent his life as an engineer, designing things and getting them built, Bell is now a researcher for Microsoft, in San Francisco. His project is his archive. He is only partly resigned to his changed circumstances. "I feel like I'm fooling around," he says. "People say, 'Gordon, you can fool around for a while.' Well, I got to have a project. I'm not a blue-sky guy at all. I'd never let anybody like me loose in a company."

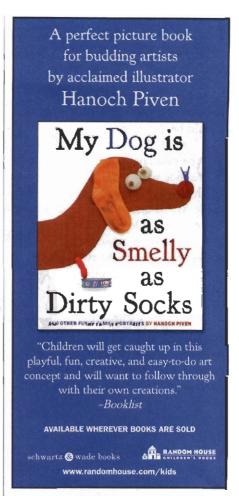
Bell's principal collaborator, for the past five years, has been Jim Gemmell, a senior researcher whose office is at the Microsoft facility in Redmond, Washington. The project is called MyLifeBits, and its purpose is to find uses for the material that Bell is storing and that he and Gemmell believe everyone will eventually store on their computers. (By 2010, a typical life, they feel sure, will fit on a cell phone.) Bell's archive has two sections: a historical part and a contemporary part. Aware that they could add to the archive anything they wanted to, Bell

and Gernmell began wondering what else they could collect. "We started thinking about Gordon's whole life," Gemmell says. "We started going into 'What if I stored everything, what would it mean, what are the implications? We don't know."

The most obdurate problem that Bell and Gemmell encountered was that there was no simple way to retrieve what they had stored, making the archive close to formless. "A black hole," Gemmell says, "because everything went in and nothing came out." Even so, they were avid to collect more.

Bell doesn't wear a walnut-size camera on his forehead. Since late 2004, however, he regularly wears around his neck a Microsoft device-in-development called a SenseCam. A SenseCam is a black box about the size of a cigarette pack which contains an infrared system—"same as in a burglar alarm," Bell says. "It senses heat—it takes a body a certain size to throw off enough heat to be recognized—and when it finds a person it takes a picture." It also takes a photograph when the light changes or at intervals up to a minute, depending on how it is set. To turn off the SenseCam, Bell puts it in his pocket—the darkness makes it stop working.

Lifelogging is the name of the activity that Bell is practicing. He is an extreme example of the form, the way Samuel Pepys was an extreme example of a diarist. Pepys's writing required attention in order to select from his experience the things he recorded. Lifelogging can be conducted with minimal engagement. You walk, and the camera around your neck takes photographs of things you may not even notice while you are occupied with whatever it is you are thinking about. If you feel your lifelog should include what you are thinking about, you can speak into a digital tape recorder, but Bell typically records only conversations. Occasionally, he feels encumbered by the project. "There's a number here," he says. "I'd like to say that I'm living ninety-five per cent of the time, keeping this system five per cent. I want to live a life, not be a slave to it." Bell's son Brigham, a software engineer in Colorado, regards his father's project as self-involved to the point of









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being "egocentric." Gordon Bell considers himself something more like invisible in terms of the archive's intentions. "I'm not particularly interesting," he says. "I'm just typical of what you should be able to do."

One morning recently, I sat in Bell's office with Bell, Vicki Rozycki, and Kim Davis, a chaperone assigned to me by Microsoft, and we toured parts of

Bell's archive. On Rozyeki's desk was a computer screen, and on Bell's there were two. "I was born in Kirksville, Missouri, 1934," Bell said. "Vicki, do you want to bring up an image of Kirksville?" and she did, an aerial photo-

graph of a town with the streets in a grid pattern. Bell studied the image on his own screen. The third screen was hlank. "Kirksville had about ten thousand people," he said. "It had a state teachers' college, but it was mainly agricultural—wheat, corn, livestock, soybeans."

Rozycki brought up the front page of the Kirksville *Daily Express* for August 20, 1934. "Has my birth announcement," Bell said. He read some of the headlines: "'45 GALLONS OF GASOLINE IN BARREI. STOLEN HERE," GERMAN VOTERS REBUKE NAZIS AND HITLER,' and, look at this, 'AL CAPONE IS TRANSFERRED TO ALCATRAZ."

"Here's where Gordon grew up," Rozycki said, "this red brick house. And here's the church."

The most thorough record of Bell's past was written, in 1993, by a man named Peter Edelstein, who interviewed Bell for a book on people in the computer business. The book was never published, but Bell has the chapter about him in his archive. From it I learned that neither of Bell's parents drank or swore. "My mother had been a grade-school teacher," Bell told me, "and my father had an eighth-grade education." His mother, Lola, was fond of books. His father, Chester, an electrician who owned an appliance store, liked reading trade manuals. Gordon, his mother told Edelstein, "asked more 'why's than any boy I ever saw."

Rozycki brought up a photograph of a wide street and, on the far side of it, a two-story red brick building, with picture windows and a green awning. "Bell Electric," she said. "His father's business."

"I started working occasionally for my father when I was around six," Bell said. "The first skill I learned was how to join a plug to a wire."

In the second grade, Bell developed a heart murmur and spent six months in bed, reading and listening to radio serials and playing with his chemistry set. His mother and father took him to the Mayo Clinic, where a doctor told

him that he would grow up to be as strong as anyone else, but that he should rule out becoming a prizefighter. Bell asked if he could become an electrician. By eight, he was working for his father after school. Being small,

he was suited to going under houses and into attic crawl spaces to install wires, but he didn't enjoy doing it. From pieces of tin, he built a motor. By ten, he had decided that he wanted to be an engineer in charge of building a dam or a power plant. When the family, which included his sister, Sharon, who was six years younger than Bell, would drive near Keokuk, Iowa, he insisted that they visit the turbines at the power plant. Edelstein writes that Bell was particularly interested by their producing twentyfive-cycle current, "so when you went through Keokuk, all the lights were flickering."

On the third screen, images summoned randomly by a screen saver began appearing. The first, in blackand-white, was of two little boys in Halloween costumes, scowling. Bell let it pass. The next, in color, was of a little boy leaning against a tree. "My grandson," he said.

Rozycki brought up a black-and-white photograph of a boy, a girl, and a pony. A caption read, "Gordon, Sharon & Snippy." Bell shook his head. "My dad thought I needed a pony," he said. "He got me a pony that I didn't particularly like. The pony would occasionally get loose and go through town, and I'd have to go chase the pony, and the pony would wipe kids off its back, because it didn't like being ridden."

On the screen to his left appeared a postcard that Bell leaned sideways to read. It was addressed to his father and signed "Opal." "That's one of the father's siblings," Rozycki said. "There

were ten altogether. They had a farm and a sawmill." The postcard was replaced by a newspaper article. "My mother's obituary, at ninety-four," Bell said.

In 1952, Bell went to M.I.T., the first person from Kirksville to go there. "Here's your letter of acceptance," Rozycki said, the clicks of her mouse making sounds like knitting needles. "I got a big trunk and put all my junk in it, and my parents took me to Boston," Bell said. The city at night, seen from the banks of the Charles River, impressed all of them, and in the hotel Bell's father wept, realizing that his son would never run Bell Electric.

"Here's your fraternity," Rozycki said.

"I joined a fraternity," Bell said.

Rozycki brought up a black-and-white photograph of boys wearing suits and sitting at a table with a white tablecloth and eating. "I fell in with two Missouri boys—Kansas City and St. Louis—who got Ph.D.s in chemical engineering," Bell said. "They were smart and supportive and nice. They helped me catch up with the prepschool kids who'd had calculus, and I hadn't."

On the third screen appeared a table with several nearly empty glasses of red wine. Bell ignored it. "I graduated in '57, with a master's," Bell said. "Computers were just being invented." He didn't want to get a Ph.D., and he had an aversion to the rows of desks that were typical of engineering firmshe believed that anything designed by more than four or five people wouldn't work the way it should. The head of his department knew a man who had started the University of New South Wales, in Australia, and he suggested that Bell teach computing there. Bell and a friend got Fulbrights to do it. At the university, Bell began seeing another Fulbright scholar, a city planner named Gwen Druyor, and when they returned to America they were married.

Onscreen, there was a photograph of a man and a woman standing side by side—his parents on their honeymoon. "St. Paul, Minnesota," he said, "1925." Two creases in the photograph showed that it had once been folded up. "I began studying for a doctorate at

M.I.T.," Bell said. In 1960, he went to work for the Digital Equipment Corporation, in Maynard, Massachusetts. At the time, the company, which is now owned by Hewlett-Packard, was bringing out its first computer. Brigham remembers that Bell "was at DEC all the time. He had an office at home, where he worked when he wasn't there, and every Sunday evening he had a meeting over the phone with the head of the company." Fatigued after six years, Bell left. "I was No. 2 by then, and took a six-year sabbatical to teach computer science and electrical engineering at Carnegie Mellon," Bell told me. Brigham says his father told him that he could teach a course only three times: "The first time to learn it, the second time to teach it well, and by the third time he was bored." Bell returned to DEC in 1972 and worked there until 1983. Edelstein writes that a colleague of Bell's says that he was "one of the most prolific idea-generators I have ever met." Edelstein also reproduces a description of Bell from a company history: "Bespectacled, with a round choirboy's face and windblown hair, Bell is a study in disarray. His mind races far ahead of his tongue. . . . He rarely finishes a sentence. He'll jump from his chair to make a point, gesturing wildly, head off for a book or paper that will show what he means, then turn around and sit down again, his mind leaping ahead to a new thought, a new insight."

The company's C.E.O., Ken Olsen, thought that DEC had become too ordered for Bell's liking. "He's fun, exciting, charismatic," Olsen said, "but he doesn't fit into a disciplined, organized environment." Bell told a newspaper reporter that he "took it personally when anybody did anything dumb." Furthermore, he said, "It is excellence that drives me, and, God damn, that's hard when you've got this thing that's built on people."

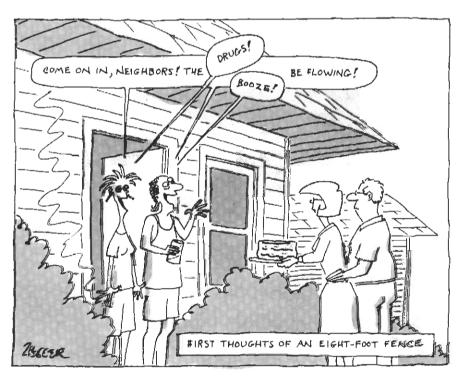
Several children in front of a plankframe schoolhouse appeared on the third screen—three rows, the teacher in the back row among the tallest children. "My father's the small boy in the front row," Bell said. Then came children in a clearing with a steam-driven tractor, beside the family sawmill. A photograph of a boy was next. Bell sat back. He flexed his brow. "That just looks like a kid," he said. He couldn't remember which one.

he cast of Bell's mind is practical, 1 and because he works for Microsoft he is trying to discover a function that the company could sell. Some of his desires are mundane. He'd like an application that would tell him how many calories he has eaten. He wants to go to a restaurant and from the bill scan the nutritional components of his meal. Gemmell also thinks a record of a person's diet and health would be valuable—"something that told me, you haven't had any fibre," he says, "or you ought to drink more water. Or something that recorded the rhythm of your heartbeats and organ function, so that when a doctor asked, 'How long have you been feeling this way?,' you could answer explicitly. Or that told you something was wrong with you before you even felt it, a program that might alert you that you're running a fever." In addition, he would like something that sorted through a person's archive and suggested actions. "Computers are mostly sitting there doing nothing," Gemmell says. "They could be going through this record and learning things about our lives, spotting trends and correlations and summarizing, saying, 'You're back in Seattle

today, and here's the people you met last time, and the notes you took that were really significant."

Curtis Wong, the manager of Gemmell's group at Microsoft, Next Media Research, would like a function that reminded him of what he was overlooking among the work he had collectedwhat, that is, might be lying among the pile of papers, or among his digital files, that was pressing. "A network display could do it, if it was dynamic and always changing," Wong says. "It's our bodies' natural inclination to ignore things that are the same, so that we can focus on things that are different—I think it's about predators. Your 'lifebits' could be surfaced, presented as patterns on an ambient display: 'A year ago I was doing X,' and there it is, or 'I haven't seen soand-so in a long time.' " He'd also like a program that would somehow present a person with material on a matter when he hadn't even been sure what to ask for. a case in which the computer would do the thinking and the organizing.

Similarly, Bell and Gemmell would like software that organized the contents of the archive into movies—something, at least, to compress and shape it, to summarize its parts. "Auto-storytelling," Gemmell calls it. "My dream is I go on vacation and take my pictures and come home and tell the computer, 'Go blog it,' so that my mother can see



it. I don't have to do anything; the story is there in the pattern of the images."

Bell has tried several times to make movies from material he's stored—he showed me one of a two-hour lunch he'd had in Australia, where he still teaches—but he hasn't felt satisfied with the results. "What we're storing, really, is snippets and scenes and episodes," he says. "A movie tells a story, and we're not doing that." What Bell and the others imagine, ultimately, is a function by which a computer assembles a person's autobiography, which he or she authorizes and passes on.

One of the models Bell is interested in is proposed by the work of a principal researcher at Microsoft named Eric Horvitz. Horvitz is engaged in what he calls "complementary computing, where the computer understands human limitations and fills in the gaps," he told me in his office, in Redmond. Horvitz, who is the president-elect of the Association for the Advancement of Artificial Intelligence—"triple-A. I.," he says—would

like to see computers provide "a fabric that would extend us in areas where we're weak. If you look at twentiethcentury cognitive psychology, what it showed was that people have yast abilities coupled with characterizable limitations and bottlenecks. There are whole areas of psychology-attention, judgment, and memory—where there are very crisp results about people doing things they don't want to do, forgetting things, and being biased in their judgment. To create a computation that understands those grooves and nooks and crannies, and using it in places where a computer can do well in a complementary way to extend people, is what I'm trying to do."

Horvitz is working on a project called Lifebrowscr, which uses time lines as a means of locating images and information. On a computer screen in his office, Horvitz brought up images of his wife and son. "What's cool—I love this feature—I can say, 'Go to July 4th,' and it's making guesses about the things

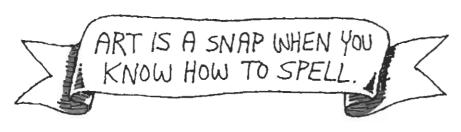
I am likely to remember, to use memory landmarks, and it jumped right to this place," he said. The screen showed several images—a small-town parade, and his wife and son among figures at a cookout, from July 4, 2005. Responding to his request, "The computer brought up its best guess," Horvitz said. He entered another year. The computer did not immediately respond. "It's thinking really hard about this," Horvitz said. "Now it's brought up a party at a beach." Horvitz tried July 4, 2003. "There's a parade again," he said. "It likes parades." He turned toward me; meanwhile, the computer brought up other images. "You can tell it, 'Be random,' or, 'Give me February 14, 2002,' or, 'Show me Valentine's Days from over the years,' or, 'Only Novembers.' It comes to understand your mind, how you organize your memories, by what you choose. It learns to become like you, to help you be a better you. Computers are going to become tools we work with and trust, rather than merely appliances."

At night, he said, he sometimes hears his computer working. "I hear the fan, and I think, My system is consolidating new memories," he said. "It's like a human being dreaming."

ell's third epiphany, a year ago, Bwas the awareness that by adding contemporary material to his archive images from the SenseCam, for example—he was building "a personal-transaction processing system." The term is from the financial world. "Every transaction you have—a deposit, signing a check—those are all registered as a unique event," he says. "Capturing all the activity associated with a Web page, or c-mails, or your phone calls, or the SenseCam means that every event in life is being logged. It has a time stamp on it. This idea of being obsessive about things is a feeling we have that this is the way things are going to be."

Gemmell imagines the computer becoming a version of an inquisitor. "People argue about the need to forget things," he says, "but if you look at business discipline—advising that you write everything down, your goals and objectives, and return to them to see how you did, examining what went wrong—I think the same thing could





happen with our personal lives. Being able to say, 'Now I realize my tone of voice was threatening'—I think there's a real positive aspect in having the real record of what things looked and sounded like, and sequences of events, because we often end up believing things that are not based on facts anymore. Of course, the question built in there is how much can we take? How much do we need not to know reality because we can't bear the truth?" Defending the psychic advantages of an electronic archive, Gemmell likes to give the example of a child who complains that his or her father, after a divorce, failed to honor his obligations. The record, Gemmell says, might prove that he made all his visits. Such reasoning assumes that the meanings of our lives, what makes us individuals, are to be found in the pattern of things that happen to us-on the surface, that isbut such a record is always susceptible to shades of meaning.

Aside from issues of self-consciousness, being an entry in someone else's archive is a problem, although not a new one. People have for centuries betrayed themselves in letters and diaries, and they have used them to betray each other. A videotape, an ill-considered answering-machine message, makes an impression that is not easily undone. Gemmell imagines that the technology involved in assembling an archive will have to protect people in case someone "gets sloppy and hits the publish-tothe-world button." He wonders whether there is a means of retracting from the record. "How do we enable it?" Gcmmell asks. "Do we know how to encrypt things and lock them down and get permission?" One of the tactics being considered is having the software corrupt a transcript by intermittently inserting phrases and words. It would be understood that any transcript, while essentially reliable, was not infallible-"an untrustworthy transcript," Gemmell calls it.

Memory revises itself endlessly. We remember a vivid person, a remark, a sight that was unexpected, an occasion on which we felt something profoundly. The rest falls away. We become more exalted in our memories than we actually were, or less so. The interior stories we tell about ourselves



rarely agree with the truth. Someone uneasy with the candor of his archive could delete the material that pained him. People do it all the time: they destroy papers; they leave instructions in their wills for letters to be burned. In the novel "So Long, See You Tomorrow," William Maxwell writes, "Too many conflicting emotional interests are involved for life ever to be wholly acceptable, and possibly it is the work of the storyteller to rearrange things so that they conform to this end. In any case, in talking about the past we lie with every breath we draw." In "The Seven Sins of Memory," the Harvard psychologist Daniel Schacter mentions the work of Shelley Taylor, a psychologist at U.C.L.A., who has written that optimistic people tend to recall their pasts more favorably, and that the versions of their selves that they recalled contributed to their mental and physical health.

A reliance on the actual record might also inadvertently distort our impressions. Schacter has conducted experiments in which he photographed subjects performing several simple activities. He showed some of the subjects photographs of them doing a few of the activities. They recalled those activities easily, but were less likely to recall the activities that they had not been shown.

"What it suggests is that there might be unknown or unintended effects," he told me. "By overemphasizing certain parts, by recalling July 4th, for example, you might make it more difficult to recall July 5th. Even if you had time, which you don't, to recall all of it, your review has to be held onto by your memory, and at some point you're going to run into the limitations of memory. The archive idea suggests you could have it both ways, and in a limited extent it might be helpful, but I don't think it would end up being so utopian. The limitations of memory will intercede."

Davis, my chaperone from Microsoft, went for a walk, so that Bell could take photographs with the SenseCam and show me what they looked like. We met at his apartment. On the corner was a fire station with a truck and some firemen outside. "Every morning around seven-thirty, they put up the hook and ladder to see if they will work," Bell said.

"I have a lot of images of that." At some distance we heard a siren. Bell leaned toward the sound. He shook his head. "They're not coming here," he said. "My dad was a volunteer fireman," he went on. "I have so many photos of firemen." He said that another thing he really likes is a crane.

Bell was wearing gray twill pants and a red turtleneck. He had a backpack and a dark blue cap that said "C.I.A." on the front. On the side it said "Honor, Bravery, Integrity."

"I got it at the C.I.A. store," Bell said.
"I have a very large collection of hats, and I like to wear this one in San Francisco sometimes, just to be contrary."

We walked to the ferry terminal and had coffce and walked back to Bell's office. Instead of looking at the photographs he had just taken, we looked at some from the day before. "I took twelve hundred photos yesterday," Bell said, "and I ended up with a thousand or so. I try to do what we call 'clean living,' which is getting rid of any redundancies."

I asked if he knew of any projects similar to his own. He sat forward in his chair and put his hands on his head and said, "What's his name? He's a super, super, super genius. English."

"Stephen Hawking?"

"Probably smarter," Bell said. "A physicist. I've known him quite a while. He wrote a program called Mathematica." He rubbed his temples and sat up. "Stephen Wolfram!" he said. "He got his Ph.D. at, like, eighteen. Last night, he sent me an e-mail. He had this time line of his life and then he had a bunch of scrapbook pages that governed a period, and on his Weh site you could click on them.

"There's another effort I should mention," he went on. "The National Library of Medicine took a bunch of Nobel Prize winners and has put their material on line. Pieces of their lives. You got all their papers, but you can't really tell what they are all about. You don't get very much about them as individuals. You get a notebook."

Bell stood up. "You will enjoy this," he said. From a bookshelf above his head, he brought down a box. He began sorting through it and talking, as if to himself. Now and then, he would lift something from it, as if it were a piece of evidence. "You got the high-school diploma, church certificates, National Honor Society, fraternity, Junior Tinkertoy Engineer certificate of award," he said. "Degrees. A couple of patents, some more patents," he said, turning pages. There were medals he had won. Holding a photograph, he said, "That's the original George Bush, in the Rose Garden." Bell was standing heside him. "Most of these are the kind of things that people hang on the wall. This is a certificate of passing the driver's school. I went to the driver's school for speeding. I just can't bring myself to throw any of them away."

He began putting things back in the box. "I've lost a lot of paper," he said plaintively. "I was pretty compulsively keeping it, but from time to time I would purge. If I had known what I would ultimately do, I would never have thrown anything away, because there's just a lot of interesting stuff I want to see."

In the article Bell wrote in 2001, to announce that he had finished the first part of his archive, he said that the obsolescence of software and technology was a threat to a computer archive. "A lot of things you may not be able to read a decade later," he said. "Will the jpeg format still be in existence? Will Word 6 be readable? I wrote an article called 'Dear Appy' "-for applications. "Basically, it was saying, 'Dear Appy, How committed are you? Signed, Lost Data.' Data can be lost in a disk, in a system, it can be lost in a standard somewhere. That's still a massive problem. If you look at all the problems that we can think about in the decade, ten, fifty, a hundred years, that's by far No. 1. The one that bugs me more than anything else is that."

"Do you ever think you'll be done?" I asked.

"Reach an end point, you mean?"
"Get bored. Grow interested in something else."

"Your aspirations go up with every new tool," he said. "You've got all this content there and you want to use it, but there's always this problem of wanting more." •

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