Doing Well by Doing Good

By: **Tekla S. Perry**

PHOTOGRAPHY: JOSON; STYLING: DANIELE MAXWELL

In his aerie atop a mortgage broker and a massage therapy center on California Avenue in Palo Alto, Calif., Jim Fruchterman seems like the prototypical Silicon Valley electrical engineer–entrepreneur. He's in his late 40s, with close-cropped brown hair, a white cotton dress shirt, and khaki chinos. He's nursing a sprained thumb from too much foosball.

His office has the obligatory whiteboard littered with lists and block diagrams; there's the warren of comfy-chaotic cubicles outside his door and the gentle clicking of his engineers pecking away at their high-end PCs.

Fruchterman could be any of the Valley's countless billionaire wannabes. But he isn't.

One of the mainstay products of his six-year-old organization, The Benetech Initiative, is Martus, a software tool for collecting and disseminating data on human rights abuses around the world. Benetech also created an online repository of books for people whose disabilities mean they can't read printed text. Up next: low-cost land-mine detectors for use by humanitarian organizations around the world. Needless to say, Benetech is a nonprofit.

Can one clever and determined techie make the world a better place? Bill Gates, to cite the most obvious example, is sure giving it his best shot. His efforts, through the Bill & Melinda Gates Foundation, to rid the world of malaria and other scourges, bolstered by US $26 billion of his own money and a pledge of stock worth $31 billion from his friend Warren Buffett, made headlines worldwide in June. But Gates and Buffett are doing philanthropy the old-fashioned way, following a script written more than a century ago by Andrew Carnegie, J. Pierpont Morgan, John D. Rockefeller, Cornelius Vanderbilt, and others. They started companies that made them hugely wealthy—and then spread the wealth later in their lives.

For the past 20 years, by contrast, Fruchterman has been working on a totally different proposition: what if the company itself, and in particular its engineering talent, can be harnessed directly to the cause of social good? When he first started pursuing the idea, it was pretty far out. Now, it's common enough to have a name: social entrepreneurship. Although Fruchterman's Benetech is the clearest example of the movement, there are others in the Bay Area: Project Impact, based in Berkeley, Calif., is producing low-cost hearing aids and developing intraocular lenses for use by the hearing- and vision-impaired in developing countries. San Francisco's KickStart International develops irrigation, building, and sanitation technologies and uses them to encourage entrepreneurial efforts in Africa.

"Back when Silicon Valley was getting started," recalls Chris Eyre, managing director of the Palo Alto venture capital firm Legacy Venture, "it was all about an engineer leaving a company and starting something and becoming successful, and then other guys thinking that if he did it, maybe we can. Maybe we're seeing the seeds of that kind of entrepreneurial revolution right now in the social sector. Maybe 30 years from now, we'll look back and see Benetech as the pioneer in the way Fairchild Semiconductor was, with many companies and people that came out of it and started other things."

"He's a Johnny Appleseed," says Jed Emerson, senior fellow with the Generation Foundation, a London-based investment firm and a visiting fellow at Oxford University. "He's bringing people into Benetech that want to work in their nonprofit environment, and over time those folks will spin out and start their own companies."

And his efforts are not going unnoticed: this past September, Fruchterman received a MacArthur Fellowship (known as the "genius grant").

Fruchterman himself, who says he didn't grow up with a passion to change the world, sees his work as a natural outgrowth of the engineering ethos. "We techies love to solve problems," he says. "We love to figure things out and love to have recognition for it."
Fruchterman came out of Caltech in 1980 with bachelor's and master's degrees in electrical engineering and applied physics (and a private pilot's license, too). He went on to Stanford to pursue a Ph.D., and like most techies there, was bitten by the entrepreneurship bug. At a series of talks by entrepreneurs, he met Gary Hudson, whose GCH Inc. was building a rocket and intended to compete with NASA's satellite-launching business.

After his talk, Hudson invited Fruchterman to have dinner. "Gary asked me who my favorite science fiction author was," Fruchterman recalls. "I told him Poul Anderson. He said, 'You're hired.'"

Fruchterman left Stanford and became GCH's chief electrical engineer. He was 21 years old. His boss there, now one of his closest friends, was David Ross, then a 30-year-old physicist. Fruchterman took charge of designing the rocket's telemetry, remote control system, and self-destruct command system. In August 1981, GCH trucked its first rocket to Texas for launch.

The rocket exploded on the launchpad. Fruchterman and Ross made sure the fire crews put out the flames and then joined a few other GCH employees who commandeered the company plane and flew it to the Bahamas for a week on the beach. By the end of the week, Fruchterman and Ross had decided to start their own rocket company.

Unfortunately for them, they never got the $300 million in funding they had sought. But while trying to get it, they met Eric Hannah, then a microprocessor designer with Hewlett-Packard. He had the start-up bug as well. He wanted to build an optical character recognition system on a single chip, something that could read anything. But he didn't have an application in mind.

Fruchterman had a great idea, one he'd been mulling over for years: a reading machine for the blind.

Fruchterman, Ross, and Hannah joined together in 1982 to form what they eventually called Calera Recognition Systems. The firm would make a new kind of optical character recognition device, one that could recognize any font without being painstakingly "trained" beforehand by its user.

Research for their business plan turned up the obvious but disappointing fact that there was no money in making reading machines for the blind; rather, the earning potential was in devices that scanned legal documents, insurance forms, and tax returns. Reluctantly, Fruchterman went along with the shift in the target market.

They raised $25 million, hired 110 people, and by the mid-1980s, they were selling font-independent character-recognition systems to the tune of $10 million a year. And Fruchterman was bored.

So in 1986, he and Ross started a skunk works within Calera to finally build that reading machine for the blind. In 1987, they showed a prototype to their investors, and they argued that although the product might bring in only $1 million a year, it would be good for public relations and employee morale.

The investors said no. Fruchterman and Ross left Calera in 1989.

They obtained the rights to start two companies based on the Calera technology: one, RAF Technology, in Redmond, Wash., to develop custom products for large government customers; the other, Arkenstone, to do the reading machine. In exchange, they had to agree not to hire any Calera employees or compete with Calera for a year.

Fruchterman spent a year dealing with the legal and logistical minutiae of establishing the new companies. He set up Arkenstone as a nonprofit organization, reasoning that at his projected $1 million a year in sales, he couldn't do better than break even, and there would be public relations and tax advantages to being a nonprofit.

For a while, both Fruchterman and Ross worked with both companies. In 1995, they split them. Ross took RAF, which today supplies optical character recognition technology to the U.S. Postal Service and to other businesses that process mail and forms. It also supplies authentication technology to the U.S. Department of the Treasury. Fruchterman took Arkenstone, which then had $5 million of annual sales from reading machines, at about $1500 each.

It was fun. For a while. In the late 1990s, Fruchterman says, "I'd been running a $5-million-a-year business for 10 years. I wanted to do more."

Around that time, he and Ross would meet regularly for long hikes through the foothills above Silicon Valley, while lengthily discussing a broad range of subjects. On one of these excursions they got to talking about various human rights outrages—including a massacre of 600 people near the Sumpul River in El Salvador in 1980 and the bloodbath in Tiananmen Square in 1989. They speculated about futuristic technologies that could protect protestors or at least alert the world if these people were killed or abused.

"From then on, we knew we wanted to do something in the human rights field," Fruchterman said. And with the boom starting to rumble, "we suddenly had all these dot-com billionaires who we thought might give us money."

Meanwhile, Freedom Scientific, a for-profit company based in St. Petersburg, Fla., that makes products for the blind and vision-impaired, made an offer to buy Arkenstone. The timing couldn't have been better.

In 2000, Fruchterman formed the nonprofit company Benetech, funded with the $3 million he got for Arkenstone from Freedom Scientific.
Today Benetech, with 20 employees, pulls in $4 million in "revenues." It gets about a quarter of that $4 million from sales of its products, a quarter from individual philanthropists or their foundations, a quarter from government grants or contracts, and the rest from traditional foundations like the John D. and Catherine T. MacArthur Foundation, the Oak Foundation, and the Open Society Institute. Last year, for the first time, technology entrepreneurs made up Benetech's largest group of individual contributors.

High-tech companies kick in a lot of noncash support. Hewlett-Packard lets Benetech buy scanners for its Bookshare project at a wholesale rate. For a time, Benetech manufactured DECtalk cards to convert the digital information into speech under a discounted license. And Intel, over the years, has donated between one and two million dollars' worth of chips to the company.

Eight of Benetech's full-time workers do engineering development; another four or five support them on specific projects. The rest manage or market the different businesses. The company has eight additional full- or part-time contractors outside the United States. And Benetech is hiring as it adds projects.

Even Benetech's payroll is an experiment in social innovation. Besides the full-time staff, Benetech has a revolving crew of temporary workers, or "fellows." Fruchterman established this fellowship program after the dot-com bust, when many talented engineers suddenly found themselves unemployed. Fellows work from six to 12 months and get roughly $3000 a month—plus full health insurance. The program helped a dozen technology professionals ride out the worst of the slump, and some found their next jobs in nonprofits, foundations, or other businesses looking to help humanity. The company also has a few engineers who are going full out in their for-profit careers but donating a few days a year consulting on Benetech projects.

Benetech pays its engineers what Fruchterman describes as "second quartile" pay scales—that is, below average, but not egregiously so. An engineer who might make $90 000 a year at IBM or GE might command $120 000 at Google and about $80 000 or $85 000 at Benetech. But the benefits are generous, and the hours are flexible to the extreme. Fruchterman even chose the company's location for its proximity to public transportation, restaurants, and other conveniences.

Says Janice Carter, a former Hasbro executive who is now the director of literacy programs for Benetech, "The fact that I'm personally making less money doesn't matter. I cover my expenses. I'm old enough to know what my needs and expenses are; I don't need to create as much wealth as possible."

Patrick Ball, Benetech's chief technology officer, says his compensation at Benetech is similar to what he would be making in academia, the only other career path he can imagine. And the opportunities to do interesting research—and to make a difference—are greater at Benetech, he says. "In academia, social science projects are small, because you don't have that much time to devote to them and you don't have the fund-raising reach to get the money to do them right," Ball says. "And academics have a hard time getting out of the university and into the field for long periods of time. Here, we're in the field constantly; I was on the road nine and a half months last year. So we get much better data."

Ball came to Benetech to run the company's human rights programs, including the Martus system—one tool Benetech is using to make a difference [see photo, "Higher Calling"].

The point of Martus, the Greek word for "witness," is to collect and disseminate information about human rights abuses.

Fruchterman and Ross didn't come up with the idea on their own. The voluble Fruchterman spent months talking about the possibilities of matching technology to human rights work. He visited people at Amnesty International, Human Rights Watch, and other national and international organizations. He went to conferences. And people confided in him about their experiences, their hopes, and their fears.

What eventually emerged is both PC software and a distributed server network that enable human rights workers to track incidents in a way that is at once simple and secure. Martus software generates forms for the collection of data. The software automatically encrypts data entered, protecting the information—and its source—in case the computer is stolen or confiscated. Whenever the computer has Internet access, the Martus software automatically uploads the data to a network of servers around the world, in such diverse cities as Bogotá, Colombia; Bangkok; Nairobi, Kenya; and Seattle. The Martus system replicates the same data on each server, so that if one server is compromised, the same information can still be accessed on other servers. Benetech's engineers assembled much of the product from open-source code but had to develop their own networking interface that could work reliably at the extremely low bandwidths common in remote areas.

Human rights workers are now using Martus to collect oral histories in Iraq and sort through the national police archives in Guatemala to document abuses during that country's 36-year civil war. They also use it to share information about continuing murders and disappearances of political activists in the Philippines, and generally track abuses in some 70 other countries.

In a related project, Benetech has been using its Analyzer software system for projects of the Human Rights Data Analysis Group, which provides data analysis services for investigative groups and does statistical analysis for human rights researchers. Analyzer development started in 1991, and Ball brought the project with him from the American Association for the Advancement of Science when he came to Benetech in 2003.

Once Fruchterman got the Martus project under way, he went back to thinking about how technology could help blind people. The inspiration for his latest endeavor in tools for the blind came from an unlikely place.

In 1999, Fruchterman lived near Eileen Richardson, then CEO of Napster. So Fruchterman knew all about Napster before most other people did; it struck him immediately as extremely brilliant and probably illegal. But it also occurred to him that he might be able to share files of books for the blind, as opposed to songs, legally. The 1996 Chafee Amendment to the U.S. copyright code allows nonprofit organizations to convert copyrighted materials that are not available for the print disabled (which includes the visually impaired, the learning disabled, and the movement impaired) into a form that can be distributed without obtaining a license or paying royalties.

Fruchterman spent a year talking to publishing groups and lawyers about the project and in 2002 launched Bookshare.org, a service to provide books in a structured digital form that can be easily and efficiently navigated with a braille reader or voice synthesizer. Bookshare charges $50 a year plus a $25 setup fee for unlimited access to its database of 30 000 books and several hundred periodicals, including 150 daily newspapers. The service now has 5000 subscribers, and Carter, who manages the project, expects it to begin breaking even at 10 000 subscribers within the next two years (the service is still partially funded by grant money). At that point, Carter hopes to roll the service out at a discounted rate to other countries.

Bookshare gets the bulk of its content from some 200 volunteers around the country who chop apart books and optically scan them into the Bookshare system. Thanks to those volunteers, Bookshare posted J.K. Rowling's latest effort, Harry Potter and the Half-Blood Prince, on 16 July 2005 at 6 a.m.—6 hours after its release. By the end of that day, almost half of Bookshare's subscribers had downloaded it. Increasingly, however, Bookshare is signing deals with publishers that commit to providing text that is already in electronic form. To prevent misuse of the files, Bookshare uses an electronic "fingerprint" system that digitally stamps each downloaded book with a code that identifies the registered user. If a copy of a book is redistributed unlawfully, Benetech can immediately tell which user redistributed that copy and will then shut down that person's account.

People who can see—but not read—will benefit from Benetech's new literacy project. In a cooperative effort with the University of North Carolina at Chapel Hill, Benetech is creating a Web-based system for teaching reading. Educators at the university are developing the content; Benetech is developing the authoring tools to let educators with little technical expertise do this

content development. Benetech is also creating the business model and the subscription service. Called Route 66, the project finished beta testing in August and is to roll out to users by year-end.

As the system is envisioned, any literate adult who knows basic Web navigation can use Route 66 to teach someone to read. The user will download material—for example, a news story, a short piece of fiction, or a poem. Along with the text and illustrations on each electronic page, a teacher's guide appears, telling the tutor exactly what to say and point out while encouraging the student to read the page aloud. Eventually, Fruchterman envisions Benetech developing a cellphone interface to adapt the reading material and accompanying tutorials for a cellphone's tiny screen.

With the Martus and Bookshare technology fairly mature, Fruchterman was ready for a new challenge. Today, he is gearing up Benetech's engineering team to put the type of explosives-detection technology at the heart of $50 000 military mine sweepers—and even costlier airport shoe and baggage scanners—into a lightweight, compact product that can be easily used by humanitarian organizations trying to clear abandoned minefields. And that will cost these organizations only $2500 to buy.

Some 100 million land mines sit in the ground of at least 80 countries; they kill or injure more than 15 000 people every year

Some 100 million land mines sit in the ground of at least 80 countries; they kill or injure more than 15 000 people every year. Today, mine removal experts, known as deminers, rely on metal detectors to find mines. But minefields are usually full of shrapnel and other debris from previous detonations, so a typical metal detector records about 100 to 500 false positives for every actual mine detected—and every positive hit must be investigated. After the metal detector identifies a possible mine, deminers use sharp sticks to probe it, through the ground, at an angle, trying not to set it off. The process is hugely time-consuming and dangerous.

Fruchterman's idea of bringing new technology to attack the demining problem goes back to 2000 and a conversation he had with a program director with the Defense Advanced Research Projects Agency. She told Fruchterman about a promising explosives-detection project at DARPA, exploiting magnetic-resonance technology that, used with conventional metal detectors, could dramatically reduce false positives. The technology makes plastic mines with tiny bits of metal distinguishable from shrapnel. Fruchterman was intrigued enough to visit the key development engineers at Quantum Mechanics, a San Diego subsidiary of InVision Technologies, a manufacturer of airport bomb-detection equipment. At the time, Fruchterman found the technology promising but nowhere near ready to be a military product, much less an inexpensive humanitarian one.

All that changed a little more than two years ago, Fruchterman says. InVision had built a prototype of the magnetic resonance land-mine detector and was close to completing an airport version of the technology. And the company had no financial interest in making a cheap humanitarian demining tool.

The detectors work because all of the five main explosives used in land mines resonate at specific frequencies. Essentially, a detector just needs to send a radio-frequency signal into the ground at each of those frequencies. If any of those chemical compounds are present, the RF energy will excite a specific atom in its molecules, which will in turn reradiate a very weak pulse.

The problem, however, was extracting this delicate return signal from the background noise. In fact, the resonating frequency of TNT, the most common explosive used in land mines, is a popular AM radio frequency, 843 kilohertz. But the InVision engineers had an ingenious solution. They got the highest possible signal-to-noise ratio by sequencing the pulses and averaging out the random noise signals. They would surround the detector with an antenna that detects the local radio environment and couple it to an on-board system that subtracts the local radio noise from the desired resonance signal.

In 2004 Fruchterman thought the InVision technology was mature enough to develop for humanitarian demining. Around that same time, entrepreneur Ted Driscoll went running with Sheldon Breiner, a friend of Fruchterman's whose specialty is the use of magnetometers in archaeology. Driscoll, who had pioneered fingerprint recognition technology back in the 1980s and managed the team that commercialized the first magnetic-resonance imaging systems at a company called Diasonics, mentioned to Breiner that he was interested in doing something with social relevance. Boy, did Breiner have a project for him!

It was the perfect time for a magnetic-resonance expert to show up on Fruchterman's doorstep. Fruchterman took Driscoll to San Diego to meet with Quantum Mechanics, and for Driscoll it was

an unexpected chance to reconnect with old friends—about a quarter of the laboratory staff had worked for him at one time or another at Diasonics.

Driscoll was sold. He joined Benetech in April 2004, officially as a consultant rather than as an employee, and agreed to run the humanitarian land-mine project. He figured he'd stay long enough to assess the technology, work out the licensing issues, and build an engineering team, tapping his network of magnetic-resonance experts. He immediately got a pile of résumés from top engineers interested in working on a project that was technologically challenging as well as socially satisfying.

In February, Benetech completed negotiating the terms of a royalty-free technology license with GE, which had acquired Quantum Mechanics' parent, InVision, late in 2004. The next step is to convince the U.S. Department of Defense that it can release the technology to a nonprofit humanitarian organization without endangering national security. Benetech has so far raised $500 000 to fund the development work; it expects to need another $500 000 to get its first mine-detection product out the door. The Benetech engineers' biggest challenge will be making the unit inexpensive and light enough to be carried easily. And they plan to lower the power consumption of the device so it will work off standard C batteries instead of an expensive military-grade power supply. They also want to substitute some cheaper, less sophisticated components, including some donated ones.

"We're taking exotic, cutting-edge technology that's truly on the leading edge of physics, and we're using it to help people living the most basic subsistence lifestyles," says Driscoll. "It's about as far a leap as I can imagine."

Social entrepreneurship—the thing that Fruchterman has been doing for most of his career—now has its own conferences, magazines, and awards (Fruchterman received one this year, the Skoll Foundation Award for Social Entrepreneurship). It even has academics who quibble over such things as exactly what makes a social entrepreneur: Is it running a nonprofit as a business venture with sales and income? Is it applying innovative solutions to social problems, whether in a traditional for-profit business or a traditional charity?

But many agree that however you define it, Fruchterman is one of the best. "Benetech epitomizes the best of both the social innovation and business enterprise approaches," says Greg Dees, faculty director of the Center for the Advancement of Social Entrepreneurship, at Duke University.

"The company is really a pioneer, and Jim is sitting up on the wagon driving it," adds Legacy Ventures' Eyre.

All the attention has pushed Fruchterman into a role for which he is eminently suited: that of a sought-after speaker at events and conferences. Inevitably, after one of his talks, engineers crowd around him, besieging him with their ideas for projects that could do good. Fruchterman patiently listens to them all and connects them, if appropriate, with people doing related work. He encourages them to approach their social ideas as they would any high-tech venture: figure out who the customers would be, what their needs are, and who might have the technological answers.

"I've suddenly gone from being a social entrepreneur for 10 years and not knowing it to being a senior social entrepreneur," Fruchterman says. "And when I suddenly found that out, I realized that part of my job now is to go out and help other people do what I'm doing."

Eventually, Fruchterman would like to be a social venture capitalist, that is, do seed investments in technology-based social ventures, pulling together the money from his engineering peers who have made fortunes in traditional careers.

And as his fans certainly hope, he just may be seeding the next business revolution.

"Yes, it would be a big jump," Eyre concedes. "But why shouldn't Silicon Valley do for the social sector what it did for the private sector?" Perhaps, once again, one smart engineer with a little Palo Alto company will change the world.

To Probe Further

To find more about Benetech, see http://www.benetech.org. For job opportunities at Benetech, see http://www.benetech.org/join_us/employment_opportunities.shtml

Duke University's Greg Dees discusses the meaning of social entrepreneurship at http://www.fuqua.duke.edu/centers/case/documents/dees_SE.pdf.

Using magnetic resonance technology for land-mine detection is described at http://maic.jmu.edu/journal/5.2/features/quantum.htm.

Figure 1

[Left] Case Files documenting human rights abuses will be entered into Benetech's Analyzer software system at the Home for Human Rights in Sri Lanka. Benetech provides services for human rights researchers. LAND-MINE removal is a difficult and dangerous business. Benetech is developing a low-cost land-mine detector intended to help deminers, like this member of the Mines Advisory Group shown working in Vietnam.

[Center] Land-mine removal is a difficult and dangerous business. Benetech is developing a low-cost land-mine detector intended to help deminers, like this member of the Mines Advisory Group shown working in Vietnam.

[Right] Bookshare Technical Support Manager John Glass [left] uses a portable braille device to read text downloaded from Benetech's Bookshare service; Benetech CEO Jim Fruchterman reads alongside Glass.

PHOTOS: THE BENETECH INITIATIVE

Figure 2

HIGHER CALLING: Ted Driscoll [left] came to Benetech from a successful engineering career to head the development of low-cost land-mine detectors for humanitarian demining. Janice Carter, a former Hasbro executive, directs Benetech's literacy programs. Patrick Ball, now Benetech's chief technology officer, originally joined the company to run its human rights programs.

PHOTOGRAPHY: JOSON; STYLING: DANIELE MAXWELL