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Each issue of *Innovations* consists of four sections:

1. Lead essay. An authoritative figure addresses an issue relating to innovation, emphasizing interactions between technology and governance in a global context.

2. Cases authored by innovators. Case narratives of innovations are authored either by, or in collaboration with, the innovators themselves. Each includes discussion of motivations, challenges, strategies, outcomes, and unintended consequences. Following each case narrative, we present commentary by an academic discussant. The discussant highlights the aspects of the innovation that are analytically most interesting, have the most significant implications for policy, and/or best illustrate reciprocal relationships between technology and governance.

3. Analysis. Accessible, policy-relevant research articles emphasize links between practice and policy—alternately, micro and macro scales of analysis. The development of meaningful indicators of the impact of innovations is an area of editorial emphasis.

4. Perspectives on policy. Analyses of innovations by large scale public actors—national governments and transnational organizations—address both success and failure of policy, informed by both empirical evidence and the experience of policy innovators. The development of improved modes of governance to facilitate and support innovations is an area of editorial focus.

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Jim Fruchterman

Developing Information Technology to Meet Social Needs

Innovations Case Narrative: Benetech

Technology can be an immense force for good in the world. However, if a technology innovation doesn't generate major financial returns, it rarely is pursued. Overcoming market failure in socially beneficial applications of information technology is the objective of my organization, Benetech. We build innovative technology solutions and widely promote entrepreneurial models for developing projects in the nonprofit community. Benetech was founded as a nonprofit social enterprise in 1989 to pursue the making of affordable reading machines for the blind, because the market wasn't interesting to my original, venture-capital backed, company. We've since branched out into three major fields in the social sector, helping provide technology solutions to people with disabilities, human rights groups and environmental groups. This case study will present Benetech's history and show how we've adapted the high-tech company to developing technology for social causes.

Benetech is a strong example of social entrepreneurship. We are part of a growing movement of people taking new approaches to solving social problems. A hallmark of this movement is approaching these problems in partnership with the communities we want to help. This approach melds features from business and the social sector, creating hybrid solutions. In some cases, the people we want to serve are our customers, providing the market-based feedback that keeps us focused on the needs of our users. In other cases, there is no revenue model, but the value exchanged is still real and shapes our accountability to our partners. In general, social entrepreneurs are tackling market failures, meeting needs where business entrepreneurs are unlikely or unwilling to fulfill. Yet, treating the communities we

Jim Fruchterman is the founder of Benetech. A technology entrepreneur and engineer, Jim Fruchterman has been a rocket scientist, founded two of the foremost optical character recognition companies, and developed a successful line of reading machines for the blind. He is now a leading social entrepreneur through his deliberately nonprofit technology company, Benetech. Benetech concentrates on applying technology to human rights and literacy for people with disabilities. Fruchterman has won numerous awards for his work, including the 2006 MacArthur Fellowship and the Skoll Award for Social Entrepreneurship in 2004 and 2006. He has also been recognized by the Schwab Foundation for Social Entrepreneurship as an Outstanding Social Entrepreneur.

serve more like customers than the recipients of charitable beneficence reflects the new realities of global society. More to the point, it works.

FROM CALTECH TO ROCKET SCIENTIST TO ENTREPRENEUR

As a Caltech engineering student in the 1970s, I had the privilege of meeting and working with brilliant and inspiring teachers. My fellow students were all linked by our love of science and technology for its own sake. We didn't know or care about business: we wanted to win the Nobel Prize in one of the sciences. The challenge was coming up with an original idea, and it was difficult imagining how this would ever be possible when you were rubbing shoulders with faculty as brilliant as Richard Feynman (the Nobel Laureate in Physics).

My breakthrough moment came in a Modern Optics class. We were learning about optical processing using Fourier transforms, and the example was how to build pattern recognition systems for smart missiles. The missile in question would have a camera in its nose, and the pattern recognition system would have a representation of the target—say, a tank or a bridge. When the target came into view, the missile would recognize the target, lock on, and swoop down and blow it up.

I went back to my dorm room, wondering if there just might be a socially beneficial application for this exciting technology. And then it came to me: you could recognize letters and words instead of tanks or bridges, and then read those words aloud to a blind person. It was electrifying: I had an actual idea! I didn't even know any blind people. Of I course fell in love with my first idea. My professor was encouraging but realistic, and the proposed design wasn't going to work all that well. However, it stuck with me, and I began to think that it might be possible to come up with more ideas.

I went on to Stanford University to start working on a Ph.D. in 1980, and began to hear about Silicon Valley and business. In quick succession, I co-founded an entrepreneurial talk series at Stanford, was hired by the second speaker in that series, dropped out of school, and joined a fledgling Valley rocket company as its electrical engineer. The rocket blew up on the launch pad (not an electrical problem!) and the company blew up along with it. We then started our own rocket company with my former boss from the first rocket company, David Ross, but no investors were willing to provide the $300 million in financing we were seeking. After struggling with this for months, Dave suggested we meet with a colleague of his, Eric Hannah, who was a chip designer for Hewlett Packard.

The three of us met in a restaurant, and Eric described his vision of building a chip that did a specific application very well, rather than a general-purpose chip like a CPU or a memory. When I asked what application he had in mind, he said that he wanted to build a chip that could read any text. My reaction was instant: "You could build a reading machine for the blind with that chip!"

To make a long story short, the three of us started Calera Recognition Systems together and ended up raising $25 million in venture capital. We invented the first successful omnifont character recognition technology: a machine that could read just about any machine-printed font without requiring human training. This technology had many commercial applications: scanning contracts for lawyers and claim forms for insurance companies, and routing the mail for the post office. But, the reading machine for the blind was always the application that had my heart: I wanted to see us build that.

My passion was shared by the rest of the team at Calera, and the marketing and engineering teams got together and built a prototype as a secret project. The moment of truth came in a board meeting where we demonstrated the prototype to our venture investors. The prototype, which at the time cost $50,000, took a page of text and ran it through the scanner, taking a digital photograph of the page. The optical character recognition turned the picture of the page into a word processor text file, just as if someone had typed it in by hand. Then, a voice synthesizer read the text aloud in a very mechanical voice. The board was intrigued, and asked me (then the V.P. of Marketing) how large the market was for reading machines for the blind. My answer was roughly one million dollars per year. This was met with silence in the boardroom.

Calera's investors understood why this was exciting as a product, but were also quite clear that a $1 million per year market was not the $100 million per year market they had been promised. To get the returns they needed on a $25 million investment, they needed us to focus on that larger market. And they didn't want us to dilute our focus with a much smaller opportunity such as a reading machine for the blind.

I reluctantly understood their position. We owed them our concentration on making their investment worthwhile. But I was still disappointed. Helping the blind was such a cool application, but not lucrative. How could we still do it, even though it wouldn't make a lot of money?

Gerry Davis, who was the software licensing lawyer for Calera, was sympathetic to my problem. His idea was that we could start a deliberately nonprofit technology company to make reading machines for the blind. It would be structured as a charity corporation, but operate like a technology company, designing and building products for the blind. We hadn't heard of anyone doing this, but Gerry thought it would be possible and offered to take it to the Internal Revenue Service as a pro bono project.

Soon thereafter, it came time for me to move on from Calera after working there for seven years. The new CEO was very concerned about the possibility of me competing with Calera or hiring away the engineers. So, in exchange for a non-compete and a no-hire agreement, I obtained Calera's agreement that I could start a nonprofit to make reading machines for the blind, since they were clear that they didn't want to take on that product themselves. Gerry Davis's law firm convinced the IRS to approve our application as a charity and Benetech was born.

ARKENSTONE READERS

I named the new organization Arkenstone, after the gem in J.R.R. Tolkien's *The Hobbit*. Arkenstone surprised me: it was the only technology company with which I had been associated that exceeded the expectations in its business plan. We hit five million dollars in revenue in our third year and were actually profitable.

Our approach was considered highly innovative in the field of adaptive technology for people with disabilities. From my background in the tech industry, I was simply using lessons I and other tech entrepreneurs had already learned. So much innovation is actually borrowing a great idea from one field and applying it to another. And so it was for Arkenstone.

Arkenstone innovated in three major ways: platform-based design, financial structure, and a user-centered approach. Together, these helped us revolutionize the availability of reading systems to blind people around the world, bringing this capability to at least 100 times more people.

Platform-Based Design

When we started, there was an existing reading machine for the blind, the Xerox-Kurzweil Reader, which was a fine piece of engineering. However, it was custom-built for the blind. Low production volumes made it very expensive to produce and at least $10,000 to purchase. Our first innovation was to build our reading machine based on the emerging personal computer platform. Initially, this was the IBM PC-AT platform. We knew that every year PCs would get better and cheaper.

Our initial reading machine had four major components: the PC, the Calera OCR board, a DECtalk voice synthesizer board, and a Hewlett Packard scanner. Together, these three additional pieces turned a standard PC into a reading machine. You could put a piece of paper or a book on the scanner, press the space bar on the PC, and 60 seconds later the DECtalk would be reading the page aloud to the user. Because it was based on a PC, it cost less than $5,000 to buy a reading system when we launched it in 1989. And, over the next 10 years, that price went from $5,000 to $4,000 to $3,000 to $2,000 to $1,500 to $1,200. Each time the price went down, our unit volumes went up and our revenues stayed about the same. As a result, more and more people got the benefit of this technology.

Financial Structure

I had spent five years as Calera's Chief Financial Officer, which helped me understand the challenges of starting a new venture. We knew we couldn't raise money from venture capitalists: the returns weren't there. It didn't even occur to us to talk to foundations. So, we structured Arkenstone based on trade credit. We didn't offer our customers credit; they had to pay for the reading machines when they bought them with cash or credit card. Calera, Hewlett Packard, and DEC all allowed us to pay them in 45 to 60 days. This difference in payment terms provided us with enough capital to build a $5-million-per-year venture with only a $2,000 loan from me to start up. We were still undercapitalized, but it was enough to run the operation.

User-Centered Approach

At the time we launched Arkenstone, the companies that made products for the disabled sold “over the heads” of the users. The equipment was so expensive that it made more sense to sell to government agencies and have the agencies give them to the users. Of course, the users had relatively little say over what equipment they received. They were expected to be happy with whatever they got. The industry also avoided hiring people with disabilities for direct sales. It was highly ironic that companies selling technology to empower people with disabilities didn’t feel comfortable empowering them to the extent of hiring them for these jobs! Arkenstone changed both of these dynamics.

By bringing the price point under $5,000, we brought a reading machine within the financial reach of far more individuals and families. Rather than government agencies, the vast majority of Arkenstone’s sales in the first few years were to individuals and families. And we changed the direct sales structure. When you’re selling a product that costs over $10,000, you can afford to send direct sales people (employees) out to sell them. We knew from the PC industry that as prices fell below $5,000, a direct sales force stopped making sense. So we created a dealer channel. But not just any dealer channel. The majority of our dealers were people with disabilities themselves. They did a terrific job for us: within three years they created the largest company making reading machines for the blind.

And, of course we paid a lot of attention to our users in the product design. We quickly replaced our front-end software (which I had written) with a better front-end designed by one of our blind dealers. Our first hire was a blind technologist from Hewlett Packard. User-centered design is a common phrase in technology today, but it was revolutionary in 1989 in the field of technology for the blind. Focusing on the users in all these noteworthy ways was crucial to our success.

Arkenstone’s Success

Arkenstone quickly became the largest maker of reading systems for the blind. We had assumed that the market was only $1 million per year, but we were wrong. Within three years we were doing $5 million in annual sales. Part of the reason for this was that many, many blind people had wanted the Xerox/Kurzweil reading machine but couldn’t afford it. Once we brought the price under $5,000, suddenly they could afford these machines and they bought them. Arkenstone is still the only high-tech venture I’ve been associated with that actually exceeded its business plan, partly because our expectations were set so low.

Arkenstone rapidly expanded outside the United States. As soon as we sold an English-reading machine, we had interested customers in many countries. When we added Spanish, we enlarged our market even more. Soon, Arkenstone became a leading machine in Canada, the UK, South Africa, Germany, France, Italy, Portugal, and so on. We adapted the reading machine to read almost all of the western European languages. We eventually had users in 60 countries reading a dozen different languages.

Using our inside track of information from our contacts in the technology industry, we knew that character recognition would soon move from a specialized circuit board to a software-only solution which would decrease prices even more. We developed and launched Open Book, the first talking Windows software product for the blind. It was available both as a bundled reading machine for the blind with a small keyboard, and as a software package that turned a PC into a reading system.

After five years, we surveyed our customers, and we learned some astonishing things. First, we found that our technology abandonment rate after one year was under 10%. Over 90% of our users were still using their reading machines one year after purchase. We felt that compared very favorably to other assistive technology, which often has abandonment rates over 50%.[1] By selling reading machines rather than giving them away, we believed we engaged our users much more deeply. Second, we found that roughly 15% of our users weren't blind at all: they had learning disabilities such as dyslexia. We had heard stories of dyslexic users, but we had no idea that they represented such a large percentage of our users, with no effort on our part and with a product that in retrospect was poorly suited to the needs of someone who could see but struggled to read.

It turned out that one feature was key. Our Open Book software highlighted each word visually as the voice synthesizer read it aloud. That way, a low vision (or dyslexic) user could see and hear the word at the same time. Multi-modal input turns out to be a key part of many techniques for teaching reading skills to students with dyslexia. The rest of the user interface was, however, designed for someone who couldn't see and used the keyboard exclusively to interact with our software. We had to redesign it completely for the needs of these different users, people who could see and preferred a visual interface that used the computer's mouse.

We built a completely different product on top of the same character recognition and voice synthesizer technology. Its name came about as a play on technical words. During that time, word processors were touting that What You See is What You Get (WYSIWYG), pronounced whizzy-wig. We wanted our dyslexic to get the interface they needed, so it became nicknamed WYN: What You See is What You Need. By the time it came to launch the product, we liked the codename so much we ended up settling on WYNN: What You Need Now. The interface could be completely driven by the mouse, and the visual display could be extensively modified to fit the user's needs. The user could see the page as a picture, with the text and graphics together, with the words being spotlighted as spoken on the picture of the page of text. Or, they could see a text version of the page, with the color scheme, size, spacing, and font adjustable for each person.

We prototyped it with learning disabled students at the University of California, Berkeley. These were very bright students who entered Berkeley and suddenly came face to face with the fact they couldn't keep up with the greatly increased amount of reading (and lacked access to the relatives who had read to them in high school). These students helped us build what turned out to be a great product for helping them get through school.

We also made a modified version of our reading system for senior citizens. Although seniors represent the majority of the blind, they had always been a small part of Arkenstone's users. PCs were intimidating, especially for a cohort of seniors that had not used computers in the workplace. So, we hid the PC and scanner inside a wood-veneered box and called it VERA, for Very Easy Reading Appliance. We wanted it to look like high-end stereo equipment.

Each of these reading machines were aimed at different segments of people who couldn't pick up and read a printed book or document. By the end of 1999, Arkenstone had sold over 35,000 reading machines all over the world. It was an exciting venture, but not all of the things we tried went well.

Arkenstone's Challenges

Even from the early days, we saw social needs where we thought technology could be well applied, needs the market was also failing to meet. In the early 1990s, I was interested in helping the human rights movement, as I discuss below in more detail. We also had lots of ideas for new products to help the blind.

One of our first five Arkenstone users said the following to me: "All my life, I have wanted to read a book and drive a car." He continued, "Now, thanks to Arkenstone I can read a book. When are you going to help me drive a car?" Our first employee, Mickey Quenzer, was blind and took the bus to work. One day, he arrived late and was complaining bitterly about the bus driver who had dropped him at the wrong stop. "If I ever get to drive a car, I'd like to run that guy over!" I know that Mickey was kidding, but it made me think about what it would take to help deal with the problem of personal mobility. We broke the problem into orientation—where am I and how do I get to where I want to go, and mobility—how do I actually travel between here and there safely? Hearing about the Global Positioning System, it occurred to us that a talking GPS locator would be very helpful to blind people.

Doing some research, we found that a visually impaired graduate student in Canada, Charles Lapierre, was also working on this problem for his master's thesis. Charles joined us via our Canadian development partner, VisuAide; together with two other Arkenstone engineers, we got a patent on a talking GPS locator for the blind, which we ended up naming Strider (another Tolkien reference). A talented blind executive, Mike May, was our Vice President of Sales, and he fell in love with the product. However, it was challenging to finance this project. Our reading machine business was operating close to break-even, and we diverted engineering resources away from our core business onto Strider. This created an opportunity for a new competitor in the reading machine field, Ray Kurzweil's second reading machine company, to gain ground, which increased the financial pressure on us.

Finally, something had to give. We had to lay off some of our staff, which was personally very painful. Our entire team was dedicated to our mission and we had let them down. We also put the Strider project on ice. Mike May, who had agreed that Strider wasn't going to make money in the short term, asked to spin the

Strider project out of Arkenstone because it was too important to let die. After several years barely surviving, Mike's perseverance paid off and he was able to secure a multi-million dollar federal research project, which carried the project until it became the viable and successful enterprise it is today.

We refocused our team on the reading systems and regained our momentum in our core business. But, we had come face-to-face with one of the biggest problems of social enterprises. Low profitability makes it well-nigh impossible to find the funds to invest in new projects. I found this personally frustrating, because I had been doing the same thing for a decade. Although the work was rewarding, I wanted new challenges. We needed to do more.

THE BENETECH INITIATIVE

In the late 1990s, I started working on a new concept to enlarge Arkenstone's work, code-named the Benetech (short for "beneficial technology") plan. I wanted to develop software for human rights groups and create more technology for disabled people. Unlike my college days, where I despaired of ever having a good idea, I now had many good ideas. They were good ideas for projects that made social sense, but not business sense. It was relatively easy to come up with good social enterprise ideas, since the lack of a profit motive frequently thinned the number of competitors to worry about to zero! My challenge was finding money for these new projects. My idea was that this money would come from my financially successful peers, the newly minted dot-com billionaires.

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Unfortunately, the dot com-ers were all busy making their money and weren't ready to give it away to someone like me. About this time, an experienced executive named Richard Chandler talked to me at a disability technology trade show. He wanted to know if I wanted to sell Arkenstone to him. I told him to go away, that we were a nonprofit and weren't interested in selling.

But, Chandler was persistent. He had started Sunrise Medical, a large company serving people with physical disabilities. He had created it by buying several other companies and building the combined entity into a Fortune 500 company. He wanted to do the same thing in the vision impairment field, and planned on buying up the leading companies in each major product segment of equipment for the blind. He asked me what my dream was, and I described my goals. Chandler offered to pay $5 million for the Arkenstone business (including the name), and would allow me and the engineering team to stay inside the nonprofit. I grabbed this opportunity.

Selling a nonprofit is more complex than selling a for-profit. We needed to convince the office of the California attorney general that doing this deal was in the best interest of the public. One way to think of a nonprofit is that it's owned by the taxpaying public and needs to be operated for the benefit of society. Our case to the attorney general was straightforward. Before the deal, one social enterprise; after the deal, three social enterprises (one for-profit run by Chandler and two nonprofit projects run by us). Also, we committed to keep all of the funds in the social sector (not that this is optional under nonprofit law). So, I didn't get to pocket the money, but I did get to control it as my new budget. The AG's office approved the sale, and in June 2000, we sold the Arkenstone business to Chandler's newly-created company, Freedom Scientific. Since we had to sell the brand name of Arkenstone as part of the deal, we changed the nonprofit's name to Benetech and began a new phase in our life.

What To Do With $5 Million?

We had to consider our strategy with this new sum of money. Did we invest it as an endowment, and run Benetech on the small income stream? I decided that we should be more aggressive and aim higher. We would invest the money over a couple of years in two new projects, and assumed we could start raising philanthropic money for the first time in our history. I had two ideas I wanted to develop with the money we received from the Arkenstone asset sale, one in the human rights field and one in the disability field. We expected that we would do more projects in the future with the additional new money we'd find.

Martus

In 1993, I'd read a story about the El Mozote massacre, which happened in El Salvador in 1981. I was bothered that more than 700 people could be killed and it could take a dozen years before the world actually believed the massacre had happened. The tough question was how to protect people from this kind of atrocity. Dave Ross and I hiked in the hills above Stanford and Silicon Valley, brainstorming about this challenge. Being geeks, we tried to come up with fancy technology solutions around defending people, but none of them made sense. We realized that the only tool to fight human rights abuse is the truth. If we could get the right information to the right people, quickly and reliably, we could address impunity. If committing atrocities led to consequences more quickly, it would discourage this kind of abuse. We called this idea Witness and immediately grabbed the domain name. As I went around talking to human rights groups, like Human Rights Watch and Amnesty International, I learned there already was a Witness Project in the human rights field. Dave Ross suggested we rename it Martus, the Greek word for witness, and the name stuck. We handed the Witness.org domain over to the Witness project, which has done great work around video applications in human rights.

Our initial idea was spying for human rights, using the same kind of technology as the government intelligence agencies. We kicked it around throughout the 1990s, but we never had the time or money to do anything real. Until June 2000.

Through meetings with actual human rights groups, it was clear that technology hadn't penetrated far into the human rights community. It was also clear that "Spying for Humanity" wasn't the first place that technology should be used. There were much more basic needs for information technology (IT) than sophisticated surveillance tools. We needed to build tools that could be used by unsophisticated human rights activists in the field.

The breakthrough in the conception of Martus came in a meeting in early 2000 with Dr. Patrick Ball of the American Association for the Advancement of Science. Patrick is one of the world's leading statisticians of large-scale human rights violations. His work involves gathering a large quantity of data about systematic violations, such as occurred in Guatemala, El Salvador, Ethiopia, Haiti, South Africa, and Kosovo. By investing the time to create a sophisticated database for these violations, and applying rigorous statistical techniques and quality control, it is possible to reach important conclusions about what happened in a civil war. For example, Patrick's work on the UN-sponsored truth commission in Guatemala led to a report that documented the systematic murder and disappearance of at least 200,000 civilians by the Guatemalan military. The analysis was sufficiently detailed and analytically rigorous that the military declined to contest the report in court or in public.

We asked Patrick if he thought we should build database tools for the kind of work he did. He demurred, pointing out that it is very expensive to create a major database project. The staff needs to be intensively trained, and extensive quality control mechanisms need to be put in place to ensure that the relational database relationships and classification standards are followed. Instead, he argued that we should focus on a technology tool that would be usable by the majority of human rights groups in their daily work. Doing a major database analysis years later with a truth commission would be much easier if the contemporary records of human rights abuses were preserved and available. He supported this idea with a penetrating analysis of the human rights sector, treating it like it was an industry. His analysis spoke to me as a tech business person who knew relatively little about human rights, but a lot about technology. Patrick's analysis formed the framework for the design and nonprofit marketing of the Martus Project.

Think of the human rights sector as a processing industry with a typical pyramid structure. At the base of the pyramid are the grassroots human rights organizations numbering in the tens of thousands. These groups are on the front lines of human rights violations. The victims of human rights abuses, or their friends and families, are coming through the front doors of the grassroots groups and pouring out their testimonies of the worst that humans can do to other humans. These narratives are the raw material of human rights work; everything else in human rights work is built with these raw materials.

Above the grassroots groups in the pyramid are the provincial or national groups. These larger groups are politically better connected, and offer their members better access to the press and political connections. They also play a role in quality control: membership in a bona fide network confers more credibility to the reports of a grassroots group.

Regional and international groups concentrate the human rights information even more. This information is aggregated and processed into higher value forms. The single incident of human rights abuse is combined with other incidents into a pattern of abuse. These patterns are the basis for international human rights campaigns against torture, slavery or abuse of indigenous people.

The human rights sector is an information processing industry. Because of the limited resources available, computers and information technology are not used to anywhere near full potential. The paradox of the human rights community is that it is an information-processing industry that has limited access to information technology.

At the top of the human rights pyramid are the organizations with the greatest influence and authority. The United Nations, followed by Human Rights Watch, Amnesty International, and the Lawyers Committee for Human Rights, have the greatest reputation and credibility with the press, diplomats, and governments. For example, the typical output from Human Rights Watch is a carefully researched report covering a national or regional problem. These reports don't include all of the individual incidents that have been reported. The Human Rights Watch brand has come to mean high-quality, exhaustively researched, authoritative reporting on human rights issues.

The common product of the human rights community at all levels in the pyramid is information. The human rights sector is an information processing industry. Because of the limited resources available, computers and information technology are not used to anywhere near full potential. The paradox of the human rights community is that it is an information-processing industry that has limited access to information technology.

We identified the field workers as being least served with information technology. The big groups, like the UN and Human Rights Watch, had good technology, but their field staffs were struggling. We traveled around the world, talking to human rights groups in Sri Lanka, Cambodia, Guatemala, and Russia. We learned

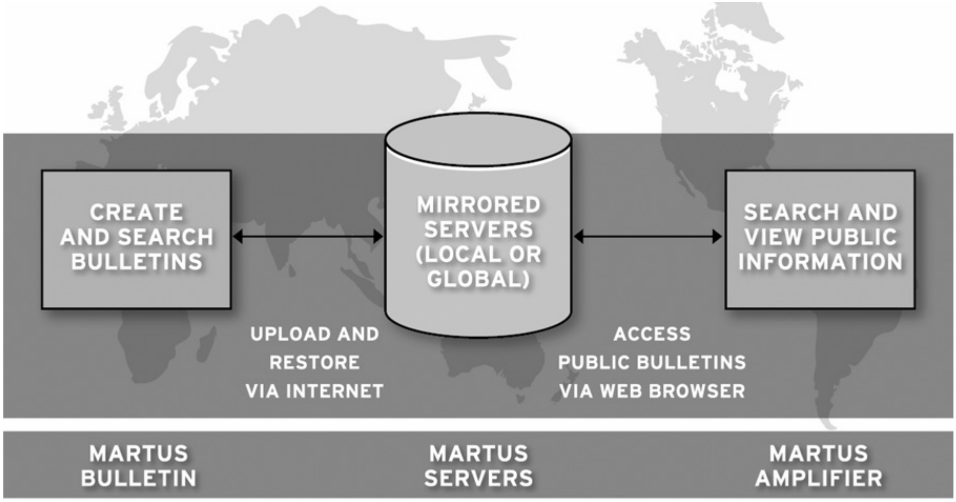

Figure 1. Martus Global Information Infrastructure.

that they needed very simple tools that could help them collect human rights violation information. We decided to build the Martus tool that met their needs.

The first piece is the Martus client, a piece of software that works on the human rights activist's personal computer. Although we originally thought we could create our software project over the web, we quickly learned that Internet connectivity was spotty and expensive for our planned users. So, to collect the data, we built a standalone piece of software that looked like simple email software. The human rights abuse information would be stored in bulletins, and these would be encrypted for security reasons. The encryption scrambles the data so it can't be read by other people who might steal the PC or intercept the information. Whenever the PC was connected to the Internet, the bulletins would be sent to a secure backup server of their choice, usually located in another country. Then, the bulletins would get copied to more servers around the world, ensuring that the human rights information wouldn't be lost. This information stays encrypted so that the people operating the servers couldn't read it: even Benetech staff cannot open the encrypted data. At the request of users, we added the option to make some of the bulletin information public and created a different kind of server, a Martus Search engine, which allows anybody in the world to read the information about human rights abuse that the local group chooses to share.

Results: Human rights groups around the world now capture violations data using Martus, which is available in languages such as English, Spanish, French, Russian, Arabic, Thai, and Nepali. The Guatemalan police archive project is the largest single user, with more than 50,000 Martus bulletins about human rights violations during the 20th century. Patrick Ball brought his human rights analysis team to Benetech in 2003 with its Analyzer human rights statistics software, and we help many countries answer the question of who did what to whom. Patrick and his team have been involved with the majority of truth commissions over the last decade. An example of Patrick's influence was his role as the lead-off expert witness in Slobodan Milosevic's war crimes trial in The Hague. As the intellectual father of Martus, Patrick is now the Director of our combined Human Rights Program, which is now the leading provider of human rights technology and statistics research.

Bookshare.org

Our second new Benetech idea came from my teenage son Jimmy. Right before we sold Arkenstone, I found an interesting new icon on my home PC. I asked Jimmy about it and he told me that it was called Napster, and it was for downloading music. Much to my delight, we spent an hour together playing with it and trading off listening to music that Jimmy liked from the 1990s and that I liked from the 1970s. The technology was impressive. At the end of the hour, I asked Jimmy how much we were paying for this great service. "Paying?" was his answer, and I realized that this was almost certainly illegal. But it was very cool. I quickly recognized how the Napster-style approach could help people with disabilities. Hundreds of Arkenstone users were scanning the exact same book over and over again. What if they could share the books they scanned over the Internet? Then we'd save many, many hours of effort and greatly increase the availability of books.

I checked in with Gerry Davis, my problem-solving attorney, and we quickly figured out that it was actually 100% legal under U.S. copyright law. Right in the basic national copyright law, it said that copyright owners had the right to control copying of their works, subject to roughly 20 exceptions for uses like libraries, educational and fair use. One of these exceptions said that it was not a violation of copyright restrictions for a nonprofit organization to make accessible copies of books available to people with bona fide disabilities that kept them from reading print books. Although no one had thought of a Napster-style solution when the exception was put into the law, it fit our needs perfectly. We briefly called the project Bookster, but within a short time we were convinced to rename it Bookshare to avoid offending publishers.

Gerry also came up with a great idea to talk to the publishing industry. Rather than spring Bookshare on them out of the blue, we would talk to them well in advance of the launch. So, a year before Bookshare was ready, Gerry got us a meeting with the Copyright Committee of the Association of American Publishers. This committee is made up of the top lawyers from the major publishers. We explained how we would honor the social bargain in the legal exception: help people with disabilities while not hurting the business interests of publishers and authors. Giving them a year to work with us to keep this social bargain gained us tremendous credibility with the publishers and convinced them to not sue us.

Our shorthand description of Bookshare was Amazon.com meets Napster meets Talking Books for the Blind, but legal! At the core of Bookshare is the Bookshare.org website. It was set up to provide a place on the Internet where people with disabilities could share their books legally. Members signed up and paid a nominal fee to be able to access the books ($75 for the first year for all the books you could read). Members had to provide proof of a qualifying disability, and agree to use the books only for their own use and not provide them to other people. Rather than us choosing the books in this new library, as had been traditionally done by libraries for the blind, our members choose the books to be added. If one person thinks a book is worth scanning and sharing, it will become available to the entire community. Our users are in charge of collection development for Bookshare.org, choosing over 80% of the titles that get added to the collection.

Results: Our volunteers have already provided Bookshare.org with more than 35,000 books, and we now have more than 100 daily newspapers available each morning through a partnership with the National Federation of the Blind Newsline program and the nation's newspapers.

A person with a disability, such as blindness, goes to our website using their talking screen reader or Braille access solution and searches for a book or newspaper. The user logs in and then is allowed to download the materials they want. The book (or newspaper) is copied onto their PC hard drive as text. The text of the book can then be read aloud with a synthetic speech synthesizer, enlarged for the low-vision person, or turned into Braille for a Braille reader.

Results: We felt that the subscription fees would over the long term provide the funding to keep Bookshare.org going. At the time of this writing, the U.S. Department of Education has just decided to pay for all schools and students with print disabilities in the U.S. to receive Bookshare.org. So, in 2008, Bookshare.org will be self-supporting from revenues.

How Benetech Picks Projects

We started with the Martus and Bookshare.org projects, but we wanted to do more. We decided to launch roughly one new project per year. We knew that we'd also have to start raising money for these new projects, since the original $5 million wouldn't last all that long. We needed to come up with a framework for making these decisions.

An MBA friend of mine, Paul Losch, adapted a venture capital portfolio model to our needs. The goals of venture capitalists, foundations, and Benetech are quite similar: how to achieve maximum results with a limited amount of money. We took each venture capital criterion and either used it as is, or adapted it slightly to our mission. The key considerations for new Benetech projects are:

- *Return on investment.* In our case, the return is to society, not to us. We frequently use benchmarking as a method of assessing returns.
- *Uniqueness.* We want to be dramatically different: no interest in being 10% better than some other solution. If it already exists, we should be doing it for a fraction of the existing cost or bringing it to a completely new community.
- *A sustainability case.* How can we keep this going without draining resources from Benetech forever?
- *Low technical risk.* We assume the technology is out there, but nobody is motivated to bring it to the social application.

Process Steps:	Overall Benetech Portfolio Strategy	Seed Opportunity Review	Business Plan Review	Project Status Review
	1	2	3	4
Frameworks to Support Process:	Review Processes Investment Objectives	Seed Pitch Seed Evaluation	Business Plan Business Plan Evaluation	Product Development plan and Status Project Plan and Status Review

Figure 2. The Benetech Project Pipeline.

- *Deal size.* Ideally in the $1 to $4 million range to encourage sustainability. The deal should be bigger than one or two people can do themselves.
- *Fit of the technology with our capabilities.* Is it in a field that Benetech knows something about? We can't take on clean-burning car engines and water purification at this time, because we don't know anything about the technology. Projects that aim at the same or a closely related community to an existing Benetech project score higher.
- *Exit options.* We try to devise three exit options before we start a project.
- *Access to resources.* Can we access the resources we need to succeed? This could be funding, access to technology or expertise. We are especially interested in getting top domain experts involved to supply the knowledge about the field that Benetech's technical team typically lacks.
- *Potential partnerships.* What partners can we leverage? How can we encourage community involvement in this project?

We also devised a process for developing and managing the projects that we took on. Projects go through a narrowing funnel as they require more funding. We have hundreds of possible concepts (free), dozens of projects that have had some brainstorming (less than $5,000), and 10 projects that we might start in the coming year or two (less than $25,000). Because these projects are not highly profitable, if we don't get to them for two years, they probably will still be sitting there unaddressed. If someone else tackles one of these projects, that's a victory for society and we have one less need to consider meeting! (See Figure 2.)

Our method of management is very similar to that of a startup high-tech company. We're customer focused and keenly aware of the need to create a strong value case for the user. We have engineers and product managers, systems administrators and sales people, tech support people and marketing people. We just have one to ten percent of the number of people on a project compared to the typical staff support of a for-profit company. This increases the need for us to work together efficiently.

Raising Money

For the first five years of Arkenstone, we didn't raise any money from outside parties, nor did we need to. We made one try in the mid-1990s to raise money for new projects from the major American foundations, and got nowhere. We simply looked too much like a business for the comfort level of foundations back then. What support we did get was mainly in-kind. We found it pretty straightforward to ask our buddies at Hewlett Packard, IBM, or Intel for donations in the form of technology: scanners, voice software or CPU chips for PCs. But money was far tougher to find from corporations. Only IBM gave us any significant amount of cash to help with our product push for people with dyslexia and to translate our products into Spanish and Portuguese, and this still represented less than 1% of our budget.

It took us a while to become able to raise money. Luckily, we had had our $5 million of conversion funding from the sale of Arkenstone to tide us over for a couple of years while we learned how to raise funds. It was easier to raise money from foundations and donors to expand projects than to fund their early stages. For example, the initial funding to create Martus was 75% from Benetech, and 25% from the Open Society Institute, which really saw the value of this kind of tool. Bookshare.org was funded initially only by us.

Two major high-tech funders then committed to supporting us. The Skoll Foundation, created by the first president of eBay, Jeff Skoll, decided to start investing in Benetech as a venture capitalist would. They provided general support grants to fund our vision. Each year they invested more until we were invited to present a three-year business plan. Skoll then made a three-year commitment to us. At roughly the same time, Pierre Omidyar, the founder of eBay, also made an investment in our three-year plan through the Omidyar Network, his combination for-profit/nonprofit social investing group. Together, these two tech leaders became our biggest funders. And, unlike typical foundation grants, they made investments in our business plan, and accepted our business plan objectives as the tracking metrics for investment results. They were structured as general support grants, but it felt more like a venture investment to me.

We also started to make great progress with some of the major foundations in the United States. We and they had both changed since the mid-1990s. We had learned more about how nonprofits and foundations worked. During this time, foundations also became much more tech-savvy and comfortable making technology grants. Our business-like approach was well suited to program officers at foundations, as long as we could link what we did to the foundation's grant-making objectives.

Benetech Today

Benetech has five major projects going at the time of this writing. Bookshare.org and the two human rights projects are fully operational and international in scope. We have roughly 30 employees and consultants, and hundreds of volunteers, and we are growing rapidly. We have two new projects being tested by prospective users with launches planned in 2008, Miradi and Route 66 Literacy.

Miradi is a tool for managing environmental projects. The environmental movement came to Benetech after hearing about our work in human rights and asked if we could also write software for field people who manage biodiversity projects for groups such as The Nature Conservancy and the World Wildlife Fund. Miradi has a step-by-step interview process (the wizard approach used famously by the TurboTax software for preparing tax returns) that guides an environmental conservation team through the steps they need to plan, manage, and report on their field project. The Miradi software is now in beta test, the last versions before the officially complete first version. Instead of the 20 beta testers we expected, we now have over 200 beta testers in 40 countries.

Route 66 Literacy is a Web-based literacy curriculum designed for teenagers and adults with developmental disabilities, such as Down Syndrome or autism. Created by Professor Karen Erickson of the University of North Carolina, Chapel Hill, it provides a literate but untrained person with the information they need to be a good teacher of reading. Benetech is providing the technology development and social enterprise structures to bring Route 66 to a larger population.

CONCLUSION

Benetech's main achievement is proving the model of a technology-based social enterprise. By replicating the model successfully with different projects and in different fields, we've shown that it is possible to adapt the high-tech business model to primarily social endeavors. We've also shown the need to take major risks when creating new technology, and have been able to fail on occasional projects without losing our support.

Benetech is not the only technology enterprise in existence. We share the leadership of this new movement with a handful of other innovative organizations, such as Institute for One World Health, Project Impact, Cambia, and Compumentor. Together, we have demonstrated the leverage of technology to make an impact. Just as Bill Gates can make many copies of a software package cheaply and distribute it around the world, so can technology social enterprises deliver their innovations globally at low cost.

The social sector lags the for-profit sector in the use of technology by two to 20 years. As the world globalizes, so should technology applications for society organizations. Hundreds, if not thousands, of great technology applications are sitting on shelves because they are insufficiently profitable to shareholders. We need to recapture these opportunities and ensure that technology fully serves all of humanity.

1.See http://www.r2d2.uwm.edu/atoms/archive/technicalreports/tr-discontinuance.htm.

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