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Light-Bulb Moments for a Nonprofit

By Christine Larson

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No baby should die or be disabled because a light bulb can't be replaced. Yet during visits to hospitals in India and other countries, Krista Donaldson often saw lifesaving phototherapy systems, used to treat infant jaundice, languishing in dusty corners because of burned-out bulbs and other seemingly simple problems.

Often, the real issue was that these donated Western systems weren't designed for local conditions.

As chief executive of a nonprofit organization called D-Rev, Ms. Donaldson had a mission: to design first-rate medical equipment better suited to developing countries, then license it to for-profit distributors in those areas. That way, she reasoned, the market would allow sales and production to grow to meet full demand.

Or that was the plan. It hasn't exactly worked out that way. "We thought if you design a good product, it will scale on its own," Ms. Donaldson said. "That works in efficient markets, but most developing communities don't have efficient markets."

In the case of the jaundice treatment, the first part of D-Rev's plan worked well. Designers and engineers came up with an inexpensive light therapy system, called Brilliance, that was rugged enough to roll smoothly across dusty, rural hospital floors, and able to cope with erratic power supplies.

But the second part of the plan — relying on markets rather than equipment donations to spur growth — has been another matter. D-Rev's commercial distributor in India, for example, found that cronyism or corruption sometimes led hospitals to select higher-cost, lower-quality products, according to Randy Schwemmin, D-Rev's director of technical operations.

D-Rev is one of dozens of small Silicon Valley start-ups aiming to use market dynamics to solve social problems. But seven years after its founding — and a decade into the rise of "social entrepreneurship" — D-Rev and its peers have found that the marriage of nonprofit motives to for-profit markets can be rocky.

D-Rev has had to become far more involved than it expected in financial models, licensing deals, consulting services and manufacturing arrangements. In essence, it is redesigning not only high-tech products but also supply chains and procurement systems.

“What D-Rev is doing hasn’t been done before,” said Kevin Starr, managing director of the Mulago Foundation, which is one of D-Rev’s donors. “They’re combining ways of designing equipment by focusing on the user and the user’s context, while also thinking about how to get it to people, about strategies for distribution and the market.”

One day last fall, the sounds of a chop saw broke the hush of D-Rev’s offices, housed in a bright loft space in the Dogpatch district of San Francisco.

“We’re building a table,” Ms. Donaldson said. The office needed more serving space for a party the next week that would celebrate a milestone for another D-Rev project, a low-cost prosthetic knee. After the party, the table — more of a bar, really — would give the staff more space for stand-up meetings, brainstorming sessions and a complicated board game then in vogue at the office.

Why not just buy a table at Office Max? “We’re on a shoestring,” Ms. Donaldson said. “Plus, we like making things.” And why not build it yourself when you’ve got saws, screwdrivers and safety goggles dangling from a pegboard in the corner? The tools are normally used for mocking up products from foam or wood, but they offer a tempting distraction in an office that employs about a dozen engineers, designers and tinkerers. Several of them trained at Stanford’s Hasso Plattner Institute of Design — better known as the “d.school” — which encourages the early and rapid building of prototypes.

Ms. Donaldson, 40, has plenty of hands-on design experience. Originally from Nova Scotia, she earned an engineering degree from Vanderbilt University, then two master’s degrees and a Ph.D. from Stanford in engineering and product design. She worked on reconstruction in Iraq for the State Department and served as a design engineer for the nonprofit KickStart International, which provides low-cost irrigation pumps to farmers in Africa.

She is still pretty good with tools herself, although it has been a few years since her days as a teaching assistant in the Product Realization Lab, a high-tech machine shop at Stanford used primarily by engineering and design students.

Ms. Donaldson examined a D-Rev phototherapy unit at a hospital in Tamil Nadu, India.

Peter R. Russo



In setting out to solve health problems, D-Rev adopts the “design thinking” approach associated with both the d.school and the design firm Ideo, where Ms. Donaldson also once worked. The approach requires intensive study of users and their surroundings — what they need, why they need it, and all details of a product’s use.

Since D-Rev was founded in 2007, its employees have visited close to 300 medical facilities, whether urban hospitals in Africa, roadside “microhospitals” in India or birthing centers in Nepal that are accessible only by foot. They’ve talked with doctors, nurses, administrators, policy makers and maintenance people to understand the barriers that might keep a machine from helping a patient.

But that has not been enough. To make sure that end prices remain low, D-Rev has needed to find manufacturing and distribution partners willing to cap prices and forgo substantial markups. In the case of the Brilliance lighting system, D-Rev asked hospitals about reputable equipment makers and then approached Phoenix Medical Systems, a neonatal equipment distributor based in India.

D-Rev proposed a deal: Phoenix would manufacture and distribute the Brilliance lighting system and cap its price at \$400, or \$500 with a warranty (Western systems can run \$3,500). In turn, D-Rev would structure licensing fees so that Phoenix made more money selling to poorer clinics than to wealthier ones.

But D-Rev realized early on that in India, the purchasing process wasn’t working in Brilliance’s favor. Hospital systems still sometimes chose higher-price systems because of bribery or cronyism, or because they didn’t understand Brilliance’s technical innovations, Mr. Schwemmin said. To help make Phoenix’s bids more persuasive, D-Rev realized that it needed to coach the company from the sidelines, especially in explaining technical features — say, why Brilliance doesn’t need cooling fans or filters.

Plans to expand beyond India, meanwhile, hit serious bumps. One distributor in the Philippines ordered eight units from Phoenix for \$500 each but then resold them for \$2,400, Mr. Schwemmin said. When D-Rev asked for the reason behind the drastic markup, the company said it needed to budget money for kickbacks, he said. Because of these and other experiences, “we feel the need to be a lot more involved in picking distributors and managing relationships, because we’re afraid of corruption,” he said.

To that end, D-Rev sent an analyst to the Philippines for eight weeks last year, to vet potential partners. It sent another associate to South America for three months to assess markets in Argentina, Brazil, Colombia and Peru. D-Rev shares its market studies with Phoenix, consults on potential new markets and stays involved as Phoenix develops new relationships with foreign distributors.

“We always expected to be a little bit involved with building markets, but it was more work than we anticipated,” Ms. Donaldson said. Fortunately, that work has paid off. Since the Brilliance lighting system hit the market a year ago, nearly 300 units have been installed in India, Malawi, Myanmar, the Philippines, Tanzania and Uganda. It has treated nearly 15,000 babies in six countries and prevented 300 deaths or disabilities, D-Rev estimates.

Though social entrepreneurship has been in vogue for many years, D-Rev’s model — nonprofit product development combined with third-party, for-profit distribution — is unusual. And it might be unfamiliar to some foundations.

“It shouldn’t be surprising that a foundation that spent its whole history solving social problems through grant-making is not going to turn on a dime and learn the different skills required for solving problems through market solutions,” said Paul Brest, former head of the William and Flora Hewlett Foundation and an emeritus law professor at Stanford. This may well change over the next decade, he added.

Some foundations are already embracing the new emphasis, and they are pressing organizations like D-Rev for specific figures on impact, such as the number of patients treated. “We design for impact measurement from the beginning,” Ms. Donaldson said. Having “specific numbers about where products go, the number of babies treated, the number of deaths and disabilities averted, has really helped us talk to funders more effectively.”

D-Rev’s operating budget grew to about \$1.4 million in 2013 from \$880,000 in 2012. Donors include the Mulago Foundation, the Greenbaum Foundation and Focusing Philanthropy. Individual donors contributed 38 percent of D-Rev’s budget in 2012.

The early success of Brilliance has led the company to tackle an even more challenging market for jaundice treatment: microclinics and remote birthing centers. In September, a D-Rev product manager, Garrett Spiegel, carried a prototype of a compact treatment system called Comet to three rural birthing centers in Nepal that were accessible only by hiking two to five hours. After

trekking up mountain trails in pouring rain and smothering humidity, Mr. Spiegel said, “I definitely came back saying that weight, as well as size, should be a priority” in developing the product.

To find and communicate with the clinics, D-Rev relied on One Heart World-Wide, another small nonprofit based in San Francisco, whose work has reduced infant and mother mortality in the Baglung district of Nepal by 50 percent in three years. Such interdependence of organizations has become more crucial. Both One Heart World-Wide and D-Rev work with another San Francisco venture, Medic Mobile, to coordinate far-flung volunteers and health assistants via mobile texting.

Yet enormous hurdles remain. While the organization has learned much about jaundice treatment and medical facilities in developing countries, specific experience with one condition may not apply to another. Ms. Donaldson appears undeterred. “There have been a lot of unexpected challenges,” she said, “but we really like solving complex problems.”

Correction: Jan. 19, 2014

An article last Sunday about D-Rev, a nonprofit organization that creates medical equipment for developing countries, misspelled the name of a country where the organization sent an associate to assess markets. It is Colombia, not Columbia.

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