

## Sustainability Leadership in Action

### Eric Thorsell: Creative Collaboration to Design Affordable Prosthetics

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In parts of the developing world, a missing limb can be a serious hazard of daily life, the result of exploding land mines or accidents unmitigated by even simple safety measures. Access to effective prosthetic devices often lies far beyond the reach of those who need them to lead productive lives. In any case, medical device makers tend to bypass this market in favor of rich-world customers able to afford more costly remedies for amputated limbs. Solutions to this dilemma require some unconventional thinking.

As a graduate student in mechanical engineering at Stanford University's Design School, Eric Thorsell had the chance to participate on a team taking on the challenge to develop a low-cost prosthetic knee for amputees. The challenge came from a non-profit organization in India that had networked with the school. For someone specializing in biomedical research and design, the project represented a collaborative opportunity to gain a wholly new perspective not only into the design of such a device, but also into the lives of those who use them.

The first of two trips to India, in the spring of 2008, introduced Eric and his team firsthand to the problems encountered by those who might benefit from their work. Over the course of conversations and observation, they learned to pay attention to significant non-obvious issues they would need to account for, including traditional postures and activities such as squatting, prayer, and toilet use. They also recognized the importance of working together, both among the team and with the project's non-profit sponsor, to develop prototypes that could be tested quickly and that would make use of inexpensive and easily-available but sturdy components. A second trip allowed for testing and transfer of the design to the local sponsor. Since completion, over 1300 patients have been fitted with the prosthetic knee in countries such as Sri Lanka and Iraq, each able to return for service and follow-up. The devices have a total manufacturing cost of USD (US dollars) 20, with a final cost of USD 25.

Eric reports that the project enabled him to apply

his skills in engineering design in a way that would afford him immediate tangible evidence of their impact. (The highly collaborative nature of the work contributed to gaining visible results within six months.) The knee, he says, is not "simply" a device that allows its users the means to walk better; it has also connected him at a fundamental level with human needs and desires. In his interactions with potential patients and others, he acquired new insights into how to **convene productive conversations** with potential users and others "on the ground." that yielded critical information for designing a device that could meet diverse needs. Eric also observes that the project challenged his own sense of personal discipline, by demonstrating the benefit of an approach that, while not perfect, could deliver serviceable and therapeutic results quickly.

#### **Observations:**

*Eric's story illustrates elements of sustainability leadership. He **chose to get involved** to resolve an "impossible" challenge -- designing a functional, inexpensive prosthetic device, available to people who would otherwise be deprived of sophisticated technology enabling them to live productive lives. He **engaged in collaboration among people with diverse backgrounds**, experiences, values and aspirations (nonprofit organizers, sponsors, local medical people, manufacturers, people with diverse prosthetic needs, technical designers) who were committed to a common goal—finding a design solution that worked and making it available to people quickly. While there were no doubt different ideas out how to proceed, differing relational power influences, differing cultural norms and interpretations of, a willingness to **collectively generate agreement and action** created the synergy and commitment needed for success. An **innovative solution emerged in an accelerated, generative process** when people were willing to set aside their egos in favor of rolling up their sleeves and working together to come up with a solution that worked. The story suggests a joint mindset for experimentation, learning, adjusting, tinkering and otherwise engaging in knowledge creation on the fly, thus deferring to and trusting the wisdom within people engaged in the process, minimizing the need for certainty, predictability and controls that are characteristics of the traditional framework for success.*

#### **References:**

Interview with Eric Thorsell, Sept. 17, 2010.  
Sustainability Leadership Relational Model, Ferdig, SLI, 2009.