

Stanford SOCIAL INNOVATION^{Review}

MacArthur Foundation Supplement
The Vital Role of Early-Innovation Funders
By Carol Dahl

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The Vital Role of Early-Innovation Funders

At The Lemelson Foundation, we seek to foster inventions that will have social impact and improve lives. But our support for early-stage innovation could not succeed without a trusted network of grantees and partners.

BY CAROL DAHL

In 2006, two engineering professors from Rice University visited the neonatal ward in Queen Elizabeth Central Hospital in Malawi and witnessed the grave challenge that many premature infants face. These infants were struggling to breathe because of respiratory distress syndrome (RDS), a breathing disorder that affects newborns. In Malawi, RDS is a dangerous condition with only a 25 percent chance of survival. But in the United States and other high-resource countries, it is easily treated with a breathing device called a bubble-CPAP, which provides continuous positive airway pressure to the infants and enables them to breathe normally.

The key challenge was that existing devices were too expensive for hospitals and clinics in Malawi and were not designed to withstand the harsher physical conditions in African health-care settings. After inevitably breaking down, these devices ended up in equipment graveyards along with stacks of other well-meaning donations not suited to the local environment.

So the professors, Rebecca Richards-Kortum and Maria Oden, returned to Rice with a mission. They engaged their undergraduate students to work with the nurses and doctors in Malawi on a design challenge to create a more affordable and durable bubble-CPAP. The prototype they came up with used a plastic shoebox from Target and two fish-tank pumps. It had a fraction of the cost of a standard bubble-CPAP but proved just as effective at saving infants' lives. The joint team from Rice and Malawi perfected the device and called it "Pumani," a Malawian word meaning "breathe restfully."

Eight years later, that one prototype has grown into an ambitious initiative called NEST (Newborn Essential Solutions and Technologies).

CAROL DAHL is executive director of The Lemelson Foundation.

to address not only RDS but also the other preventable causes of newborn mortality in Africa. The Rice 360° Institute for Global Health (Rice 360°) team is also working with African universities to help create a sustainable pipeline of inventors and engineers to solve local and regional health challenges. The Lemelson Foundation was there at the earliest stage, providing support when it was still just an inspired idea—that undergraduate engineering students could be part of creating products to have real social impact in the world. Starting with one small grant through our longtime partner VentureWell, we were part of an ecosystem of upstream funders that helped Rice 360° develop their idea from a college course into a scalable program that in 2017 was awarded a \$15 million grant from the MacArthur Foundation's 100&Change competition. NEST is now on track to receive more than \$60 million in new funding.

Innovative initiatives are often most in need of support during that crucial early stage, but that is also when they pose the most risk for investment by governments or the market. Philanthropic and corporate social responsibility capital is available to help support scaled implementation of the most promising projects, but there is a shared responsibility for both upstream and downstream funders to manage related risks.

Through 23 years of grantmaking, we have learned along with our grantees how to help incubate invention-based social entrepreneurs to reach the point where they are ready to scale through large awards from downstream funders. We have found that it takes more than great ideas and visionary, dedicated leaders. It takes well-aligned partners committed to learning together. It takes patient and strategic support to help them refine their approach and

build institutional capacity. It requires starting small and infusing the right kind of funding at the right time to help grow their efforts. And it takes an ecosystem of funders who bring their specific strengths and resources to bear at different stages along the pathway.

INVENTING AN ECOSYSTEM

Prolific inventor Jerome Lemelson and his wife, Dorothy, founded The Lemelson Foundation more than two decades ago. Since that time, the foundation has helped grantees in both the United States and developing countries launch more than a thousand invention-based businesses and initiatives following a philosophy we call "impact inventing": creating new products that have positive social impact, are environmentally responsible, and are financially self-sustaining.

The foundation is small in staff but large in ambition. Our goal is to create and support a more vibrant invention ecosystem focused on problems that are worth solving, leading to products that make a real difference in people's lives. Rather than open solicitations or running competitions, we employ a different approach as a moderate-sized, early-stage funder. After setting our strategic direction, we rely on a network of trusted grantees and partners on the ground to seek out promising opportunities for our work. Sometimes, when we find that those partners do not yet exist, we help create them.

This was the case with VentureWell, one of our earliest grantees. VentureWell is an NGO that supports early-stage inventors and entrepreneurs. In the early 1990s, Jerome Lemelson recognized that there was a real lack of support at the university level to help foster invention-based entrepreneurs. Seeing that there was no organization in this role, he set out to create one.



He formulated a vision for higher education to engage students in inventing meaningful solutions with market potential, which led to the creation of the National Collegiate Inventors and Innovators Alliance (NCIIA). NCIIA supported the success of student invention teams, so that these teams could advance promising ideas through entrepreneurship.

NCIIA was founded at Hampshire College in 1995 and was incubated as an autonomous program by a consortium of five colleges. In 2001, NCIIA became an independent 501(c)(3). With our continued support, it developed effective approaches to incubating student-led, invention-based enterprises that could be self-sustaining, scalable, and attractive to downstream investors. However, 15 years into this work, we realized that reliance on our funding put NCIIA at risk of functionally becoming a subsidiary of the foundation. We also recognized that they had value to offer way beyond what we could support on our own.

Working with Phil Weilerstein, NCIIA's leader, we supported the development of a broader focus and the diversification of funding sources. Providing introductions and even cofunding projects with new funders helped NCIIA solidify sustainable funding through other partnerships. Eventually, The Lemelson Foundation's stable support level decreased from 80 percent of NCIIA's annual funding to just one-fifth of their current \$15 million annual budget.

NCIIA evolved into VentureWell, and the organization continues to be a close partner of the foundation and now enjoys rapid and sustained growth with a robust and diverse funding stream. At the outset, it was solely focused on the United States, but now it has global reach, with significant grants from the US Department of State, USAID, the Bill & Melinda Gates Foundation, the Kauffman Foundation, and many others. VentureWell's programs have reached tens of thousands of students and faculty, and it has supported the creation of more than 600 invention-based companies with social impact that have raised close to \$1 billion in additional investment.

For us, this formative experience was a lesson in patience, rethinking organizational structure when necessary, and supporting capacity building. It also taught us that a diversity of funders is key to taking an organization to the next level. Now, VentureWell is a major partner in the startup ecosystem, helping to position additional ventures for funding to scale.

INCUBATING INDIA'S SOCIAL ENTERPRISES

While VentureWell helped promote impact inventing in the United States, The Lemelson Foundation knew that a crucial component to addressing the world's most pressing problems involved supporting invention in the developing world. In 2002, we developed a strategic

Kinnos, a health-care company started by Columbia University students mentored by VentureWell, developed a disinfectant solution in response to the 2014 Ebola outbreak.

approach using recognition and mentoring programs (RAMPs) to foster inventors in developing countries. The RAMPs would allow us to identify key projects through

recognition awards, and link them to mentoring to grow their ideas and business models. We went looking for partners that could help us achieve this work, and in India we found Villgro.

Villgro started as the vision of Indian social entrepreneur Paul Basil, who used a venture capital investment model to support small-scale farmers who had developed agricultural innovations that were cheaper than traditional tools and were designed to work in low-resource settings. In 2004, we helped Basil with a grant of \$100,000 to expand his startup through a RAMP model. But we learned over time that there were gaps in our original vision. Recognition awards and mentoring alone were not having a large enough impact on the growth of invention-based social enterprises in India.

So we worked with Villgro to provide targeted resources throughout this process, rather than large infusions of money that they were not yet equipped to deploy effectively. This included funding a review to look at Villgro's organizational and financial structure, and support for building capacity based on that input to enable continued learning and experimentation. We also provided different types of funding as needed to establish a successful model. Villgro discovered that they needed equity money to

support companies suited for investment and scaling up, arguing that companies needed to move beyond grant funding because it is considered a deterrent to downstream investors. The Lemelson Foundation became an anchor partner for starting the Menterra Social Impact Fund along with other foundations and India-based angel investors. Working together, the Menterra Fund and Villgro now provide the capital for early-stage impact inventors and entrepreneurs throughout India.

Villgro evolved into the premier incubator of social enterprises in India. It has cultivated nearly 150 innovators, who have raised more than \$18 million in follow-on investments—11 times the initial funding it received. Their social enterprises have created 4,000 jobs and have helped incubate life-improving products that have reached nearly 20 million people.

CREATING A PIPELINE OF GLOBAL HEALTH INVENTORS

The lessons we learned as an early-stage funder for VentureWell in the United States and Villgro in India informed our growing partnership with the Rice 360° team as their vision expanded, their impact grew, and new funders came on board.

Richards-Kortum and Oden's initial program grant from VentureWell allowed them to create a hands-on engineering education program at Rice called Beyond Traditional Borders. With additional funding from the Howard Hughes Medical Institute, this course evolved into the Rice 360° Institute for Global Health, which launched the first bubble-CPAP prototype (i.e., Pumani). An additional grant of \$10,000 from VentureWell was used to partner with a product design firm to build a more refined version of Pumani, and VentureWell's Xcelerator training program then helped prepare them for the next stage of scaling. Cross-cultural collaboration was key to their work from the beginning. They developed their design by working closely with the University of Malawi College of Medicine and Malawi-based pediatricians Liz Molyneux and Kondwani Kawaza, as well as the neonatal nurses who would be using the device.

In 2013, a global innovation award from another one of our longtime grantees and partners, the Lemelson-MIT program, enabled the Rice team to build capacity by constructing a new infant ward at Queen Elizabeth Central Hospital as an innovation hub in Malawi to introduce and test their technologies. Rice 360° received one of the first Saving Lives at Birth grants from USAID to conduct the clinical trials needed to drive investor interest in their

bubble-CPAP. After proving its success, they worked with the Malawi Ministry of Health to make Pumani available in all of the country's hospitals at one-tenth the price of comparable systems in the United States.

But their story does not end there. Richards-Kortum and Oden recognized a larger problem: Every year, 1.1 million babies die throughout sub-Saharan Africa for a variety of reasons. Seventy-five percent of those deaths are preventable with technologies that have been available in high-income countries for over 50 years, but most of these technologies are not suitable for use in Africa. Their goal for Rice 360° was to tackle the key mortality causes with a suite of low-cost, rugged devices similar to Pumani. This vision underpins their NEST program—17 complementary devices intended to provide high-quality, comprehensive care for preemies and full-term newborns in Africa.

In 2014, Rice 360° came to us with an idea to make their work more sustainable by increasing local innovation capacity in Africa. The partnership between innovators in Malawi and at Rice gave rise to the notion of introducing the design-based bioengineering approach to engineering students in Malawi. The Lemelson Foundation provided seed funding to launch a program that would offer design-based bioengineering education for students at the Malawi Polytechnic school at the University of Malawi. The long-term goal is to harness the power of local invention and entrepreneurship, as well as create a sustainable pipeline of biomedical engineers required to support the introduction of new technologies to African health-care institutions. Malawi Polytechnic and Rice University students now participate in a bidirectional exchange, learning from each other as they invent and innovate.

Here, the pathway from idea to impact started small, with targeted and incremental funding for achievable goals. But Rice 360° was engaged throughout the process with a collaborating ecosystem of upstream funders, building capacity and organizational structure along the way. All this led to a point where Rice 360° and their NEST technology was poised to compete in the 100&Change program and go to scale with the support of the MacArthur Foundation, The Lemelson Foundation, and other funders.

THE ROLE OF UPSTREAM FUNDERS IN SUPPORTING SUSTAINABLE DEVELOPMENT

Upstream funders play a critical role in building a pipeline of organizations that have the

capacity to absorb large grants and deliver on the promise of both scale and impact. As early funders, we must be willing to take initial risks to support innovation and invention at these beginning stages. And while those risks are high, the rewards can be great, both for the organizations and for the social impact they can generate.

Through our experiences with VentureWell, Villgro, and Rice 360°, we now have perspective on how early-stage funders can help create this pipeline. First and foremost, start small with metered funding. Although large amounts of money early on might seem attractive to many grantees and funders, it can be detrimental to organizations that have not yet found their organizational foothold and the optimal model to scale their efforts. Next, take the time and expense to build relationships based on trust with grantees that are also aligned with the core capacity of each partner. Be iterative; accept risk and, especially, failure. Showing a grantee that you are in it for the long haul helps both sides create transparency. And finally, be confident in the long-term goals you are trying to achieve, and unafraid to change course or organizational structure in service of those goals.

Also key for early funders: Know your limits. We cannot (and should not) always take an organization to the next stage. Dependence on one funding stream can ultimately limit the potential to achieve maximum scale and impact. Different sources of support play different roles along the pathway. In the end, you have to prepare your grantees to tap into the larger ecosystem and build relationships with follow-on funders.

Relationship-building requires engagement with the entire ecosystem of partners needed to take an organization from idea to impact. By proactively collaborating with early funders, downstream funders will have a greater opportunity to identify and cultivate successful projects ready to grow to scale. Downstream funders also have a responsibility to help their grantees build capacity and prepare for the funding cliff that naturally occurs when large award programs come to a close.

Ultimately, whatever our role in this funding ecosystem, we all share the same goal: creating projects for social impact that no longer rely solely on philanthropic support. Such enterprises must develop the capacity to become self-sustaining through government funding or market mechanisms so that their work for public good becomes woven into our social fabric. That is the true pathway to sustainable development. ✕