Is the foundation of justice also the foundation of engineering?  
By Chintan Vaishnav | Sloan School of Management & MIT Tata Center

Perhaps the most universally accepted law behind the idea of justice is the one about ‘treating others the way you want to be treated.’ This is the law that got baked into John Rawls’ highly influential magnum opus, A Theory of Justice.

Our work at the MIT Tata Center over the past three years has taught us that the same law may also be fundamental to building purposeful engineering solutions in a resource-constrained setting, as it determines how fairly we evaluate, and therefore how deeply we understand the needs of those consumers, supply-chains, and institutions.

The central question is, how effectively are we able to empathize with the stakeholders pertinent to a given problem? This question is important because at MIT, if we hope to positively impact underserved communities globally, we must begin by accepting that we are starting as an “outsider.” Specifically, we are at a great geographical and cultural distance from the communities we are trying to affect, and we do not experience the social, political, and market forces in the same way as those living it. It is not surprising then that the communities we work with may consider MIT an outsider. Is it possible for us to engender greater trust, to become an insider? In our experience, it is, and the most effective way of doing so is to develop deep empathy – the ability to feel the constraints of all stakeholders involved. (cont. inside)
Developing empathy is of “supreme importance” ended up in the same situation. More importantly, starting with the farmer requires one to be in a listening mode, respecting and learning from how farmers cope with their current constraints. We now understand how entrepreneurial the smallholder farmer has to be to survive in this environment.

Second, we have leveraged games, design workshops, and social science methods to accelerate our understanding of the context. For example, it has been very effective to use IRMA’s Naranpur Express game to experience the forces that act upon rural farming communities, something very difficult to do without immersive ethnography. Similarly, we have used a combination of short surveys, interviews, and design workshops to elicit the preferences of a smallholder farmer as we make progress on our projects. Doing so has not only helped us gather coarse-level user preferences but has also at times delivered insights critical enough to refocus research in early stages. For example, our soil health project got refocused to point-of-use soil testing and recommendation as a result of such fieldwork. The use of these tools to understand or design in resource-constrained setting is not new. What is new is combining them with rigorous graduate-level research to distill problems that have the potential for contributing to scholarship as well as improving lives in a significant way.

Finally, for each of our projects, we work on developing strong partnerships with those who can help in mentoring or execution. Our work in agriculture, for example, began under the generous guidance of India’s well-known agricultural engineer, Prof. Gajendra Singh, and the Indian Agricultural Research Institute (IARI). They collectively helped identify topics that leverage MIT’s strengths as complementary to that of the institutions in India’s agricultural sector. Similarly, partners such as the Deshpande Foundation, Pradan, and Organic Farmers Organization of India have brought realism to our understanding of local situations and helped the execution of our projects in India. Can you imagine putting a student born and brought up in Cambridge, Massachusetts in front of a smallholder farmer.

The supreme importance of understanding others is well known and is not limited just to this context. However, our challenge here is more acute. For example, consider our work on agriculture where the most important stakeholder is a smallholder farmer, someone owning less than 2 hectares of land. In India, they make up 86% of all farmers. Their context is so far removed from the one we are in, that most people with higher education—let alone MIT graduate students—have never experienced anything close to it. How does one then nurture the ability to share the feelings or understand the constraints of such a farmer?

At the Tata Center, we have evolved a toolkit that involves three sets of measures for narrowing this empathy-gap. Let me illustrate them with the agriculture example.

First, we begin each of our projects by spending as much time as possible with farmers and their context. This discipline focuses us on understanding the present conditions and reasons behind them, as opposed to making assumptions or jumping to conclusions. Starting investigation by putting farmers first does require us to have a firm conviction that the challenges confronting a smallholder farmer are largely present due to the environment they are in, not their own shortcomings. It is now clear to us that anyone in the place of a smallholder farmer would have
living in Shishuvinal, Karnataka, and have them instantly focus on problems of mutual interest while forgetting their differences? It is because of these mentors and partners that we have been able to do so.

Nurturing good partner relationships is a long-term process. We have to work hard to develop genuine commitment on both sides. Learning to identify good partners and nurture long-term relationships in an international setting is a byproduct of our problem-specific work, and the value of these skills is real, even if it is difficult to quantify.

Together, these measures are helping us lower the trust barrier, one stakeholder at a time. It is gradually making us that “insider” we wish to be. So, what are we learning by being on the inside that we could have otherwise? Being on the inside is producing a perspective that is different from the one that emerges if one limits themselves merely to library research, aggregate statistics, and popular press. It is clear that unless we are ready to offer farmers the same quality product we expect for ourselves, to offer partners the level of innovation we would ourselves adopt, to offer suppliers the sustainable business propositions we would ourselves invest in, and to offer regulators the rational policies we would ourselves implement, we are not likely to succeed in making a positive impact.

In other words, unless we are ready to treat others the way we expect to be treated, we are not likely to engineer solutions worthy of resource-constrained communities.

Takeaways from August 2015 Farmer Interviews

Soumya Braganza and Ron Rosenberg

**OVERCOMING DIVERSITY OF PROBLEMS**
Farmers face very different problems depending on which area they are from; water, pests, disease, and wildlife can supersede soil health concerns

**LEVERAGING COMMUNITY INTERACTION**
Community networks are a powerful tool to encourage technology adoption

**TECHNOLOGY ADOPTION**
Farmers use mobile phones but mostly for calling; small proportion of older farmers and most of younger generation are comfortable with SMS/Android/computers

**FARMER TYPOLOGIES**
Farmers can be broadly categorized by: land size, attitude, experience, dependence on farming, productivity, quality of land, cropping method

**PERCEPTION OF GOVERNMENT**
Very negative perception of government services; really value the notion of individual use and only trust themselves
Cold Calls - Mark Jeunette

The Tata Group is an incredible resource to have when it comes to networking. Combined with the myriad other connections Tata Fellows have made over the last few years, we are usually no more than two degrees of separation from anything we could possibly need in India for our research. But what happens when that’s not the case?

I was looking for a plane and pilot to take me up for some aerial photography of farmland. A connection at IISc Bangalore was promising, but proved to be too expensive. An ultralight pilot in Hyderabad was enthusiastic, but then stopped replying. It finally came down to our old friends Google and email: I cold-emailed/called a few flight schools, and one in northern Maharashtra replied. In the end I got my aerial photos, and now I’ve expanded my network into the pilot community in India.

Not all Tata Fellows fit the classic introverted engineer mold, but if you’re like me, you require a bit of a push to make those cold calls. Consider this that push. You’ll most likely find what you need and build your network even further, which will also help future Tata Fellows.

Starting Up Khethworks in India

Katie Taylor

At Khethworks, we make solar powered irrigation systems that are perfectly fit for small-plot farmers in eastern India. As a young startup, we have had an exciting entry into the entrepreneurial world, having completed MIT’s Global Founders’ Skills Accelerator this summer. We have also connected with the Indian startup community through events such as Startup Konnect, where we spoke with Prime Minister Modi. (Later, in his speech, Modi spoke about us!)

In the end, it’s about the farmers. As we look to serve our customers on their timelines, we are moving to India in January and sprinting to deliver units for the start of the Zaid (dry-season) crop in February. We are pairing an intense tech development push with a dive into business modelling to prioritize which assumptions to test and which risks to mitigate.

All of us at Khethworks are thrilled to immerse ourselves both in the dynamic startup community in Pune (where we will be based) and in the small plots of farm land that canvas eastern India and that underpin the futures of millions of farmers.

Khethworks team: Katie Taylor, Victor Lesniewski, Kevin Simon, and Marcos Esparza

http://tatacenter.mit/edu/portfolio/khethworks/