I Dream of…A Product Characterization Lab

PennState College of Engineering
HUMANITARIAN ENGINEERING AND SOCIAL ENTREPRENEURSHIP

PennState Materials Research Institute

Nicholas Frazzette, Janak Jethva, Khanjan Mehta, Josh Stapleton, Clive Randall

The Pennsylvania State University

Why characterize products for harsh environments in LMICs?

Many products fail in harsh operating conditions in low- and middle-income countries (LMICs) because they are not built to withstand unforgiving conditions such as the following:

Harsh environmental conditions

Rough travel conditions

Improper handling

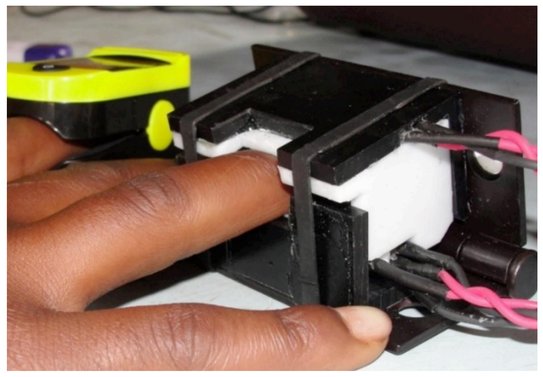
What parameters should be tested for product durability?

Products should be characterized using rigorous testing and ruggedized accordingly for all the relevant environmental and usage factors listed below:

Physical Context of Use

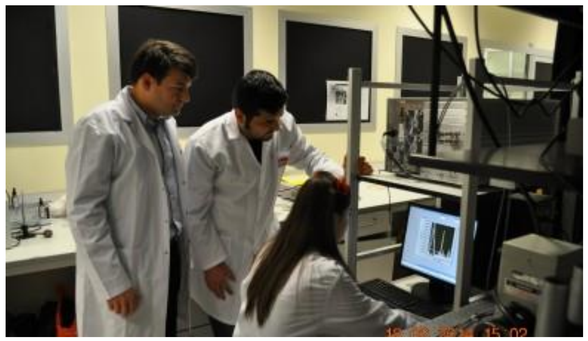
Environmental Factors	Usage Factors
Dust	Vibration
Water	Pressure
Humidity	Shear
Heat	Shock
Sunlight	Fatigue
	Scratch

What are the benefits of product characterization and ruggedization?



- **Ensure continued product performance** in low-resource settings where maintenance is difficult
- **Increase lifetime of the product** and thus customer satisfaction
- **Accelerate product development cycle** without having to spend large sums of money to acquire test equipment or scientific expertise

What would the Product Characterization Lab look like?



The blueprint of Product Characterization Lab is inspired by Materials Characterization Lab at Penn State. It will have a **core facility** that includes **instruments, expert personnel and supporting staff**.

Equipment Needed	Test Parameters
Environmental chamber	Water ingress, humidity, temperature and solar radiation
Dust chamber	Dust ingress
Shaker system	Vibration
Linear abrader	Scratching
Drop tower	Drop shock
Dynamic and fatigue testing system	Mechanical fatigue, stress and pressure

- It will provide state-of-the-art material testing and expert advice to startups and academic teams on a **fee-for-service model**
- It will help humanitarian ventures **reduce costs** and **minimize risk of failure** in LMICs.

Join the Dream!

Our endeavor is to see these labs become available around the globe to serve as nuclei for research and innovation.

- Will a fee-for-service product characterization and ruggedization lab facilitate your product design and dissemination endeavors?
- What testing regimens would you be most interested in?
- Are you interested in forming a coalition to materialize this dream? Contact khanjan@engr.psu.edu