Mortenson Center in Engineering for Developing Communities
UNIVERSITY OF COLORADO **BOULDER**

Research Seminar

Measuring and Incentivizing Impact in Development Engineering and Global Health

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Date: Monday, March 5, 2018
Time: Noon to 1:00pm
Location: SEEL 303 (lab building at SEEC)

Abstract:

Nearly a billion people in the world lack access to safe drinking water, two billion have inadequate sanitation facilities, and three billion use firewood for their daily energy needs. Combined, these resource limitations are among the leading causes of death, and economic and political insecurity. Exacerbating these problems are the global effects of climate change.
In many countries, service providers are often utilities providing access to clean water, safe sanitation, and affordable energy. However, in many developing countries, there remains a significant gap between the intent of service providers and the impacts measured over time.

A combination of technologies may help address these information asymmetries and enable improved decisions and response. In particular, in-situ "Internet of Things" (IOT) sensor technologies directly measuring water service delivery and relaying data over satellite and cellular data networks can enable improved feedback and accountability.
In one program in Rwanda, hundreds of sensors were installed on rural handpumps as a longitudinal cohort study. In the baseline, 56% of the study area's pumps were functional, with a mean interval to repair (time between a pump breaking and being repaired) of approximately 214 days. In the study period, the sensor triggered repair interval was nearly 26 days with a functionality rate of 91%.

In a water filter and cookstove program in Rwanda, instrumentation was used to monitor health behaviors, correlate adoption to health outcomes, and monetize program impact through carbon finance and "health credits". The program has to-date reached over 1.6 million people across over 350,000 households and demonstrated a 30% reduction in the prevalence of diarrhea and respiratory illness among children under 5.

Presently, a group of partners are currently installing satellite connected sensors on boreholes in the arid regions of Northern Kenya and Afar and Somali Regions, Ethiopia. Today we are monitoring over 1.5 million people's water supply, scaling to 5 million in 2018. Roughly half of water systems are functioning at any given time. Our intervention is aimed at achieving continuous functionality of services. Two ongoing experimental evaluations, in Kenya and Ethiopia, will establish our impact.

These efforts are incorporated into an emergent area of teaching and research – Development Engineering. The field requires rigor equal to any other engineering discipline and engineers must necessarily cross-train with other established development disciplines including global health, economics, public policy and social business.

Biography:

Evan Thomas is an Associate Professor at Portland State University and Oregon Health & Science University and Director of the SweetLab. Evan holds a PhD in Aerospace Engineering Sciences from the University of Colorado at Boulder, is a registered Professional Engineer, and holds a Masters in Public Health from the Oregon Health and Science University.

Professor Thomas' research has been funded by the National Science Foundation, the World Bank, UNICEF, the United States Agency for International Development, the United Nations Foundation, the United States Centers for Disease Control and Prevention, the United Kingdom Department for International Development, the Gates Foundation, and others.

Professor Thomas was the Chief Operating Officer of DelAgua Health from 2012-2016. He was responsible for conceptualizing, designing, and operating a $25 million-dollar public health intervention in Rwanda in partnership with the Government of Rwanda. Thomas was a founding volunteer with Engineers Without Borders-USA in 2002, which led to co-founding Manna Energy Limited in 2007. Manna was acquired by DelAgua Health in 2013. In 2012, he founded SweetSense Inc.

Professor Thomas was previously an aerospace engineer at the NASA-Johnson Space Center, designing microgravity fluid management technologies and water recovery systems for the Space Shuttle, International Space Station, and future space exploration. In 2017, Professor Thomas was a finalist for the Canadian Astronaut selection, finishing among the top 12 candidates from nearly 4,000 applicants.