Engaging with UNHInnovation – A Graduate Student Perspective

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by:
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At UNHInnovation (UNHI), our main goal is to help get UNH-derived ideas out into the world and maximize their social and economic impact. We work most often with faculty, but frequently support graduate students as well. We help many innovative Wildcats manage, protect, and commercialize the intellectual property they've been working on during their time at UNH. We also provide services like mentoring and commercialization training that can help faculty, staff, and students gain a better understanding of their work's potential and how to get their ideas out into the world. We asked Alexandra Evans, a Ph.D. candidate in the NRESS program to share her experience engaging with UNHI and participating in UNH I-Corps commercialization training.

What is your background and what are you working on right now at UNH?

My name is Alexandra Evans and I am currently a Ph.D. candidate in the NRESS program at UNH. I earned my B.S. in Environmental Science and M.S. in Geology from Rensselaer Polytechnic Institute (RPI) in 2015, where my research focused on environmental geochemistry studying contaminant chronologies in sediment cores from New York City drinking water reservoirs. I knew when searching for doctoral programs that I wanted to continue to work on freshwater systems, and I wanted to engage in more fieldwork. I contacted Dr. Kevin Gardner, now my advisor in UNH's Civil & Environmental Engineering Department, and he shared with me an opportunity to work on a new project he called the "Future of Dams." This project gave me the opportunity to work on a large interdisciplinary team studying the economic, technological, ecological, social, and political trade-offs associated with different kinds of decisions about dams to inform and empower stakeholders.

My current dissertation research focuses on developing new ways to measure and monitor ecological impacts from dam restoration efforts using the aerial perspective of drones. Drone imagery can be used to make maps and models of rivers that offer a landscape-scale perspective of the changes following a dam removal. These maps and models, coupled with

technologies like Geographic Information Systems (GIS), allow me to visualize and quantify these changes to better understand how restoration efforts are impacting ecosystems.

What is your innovation and how did it come to be?

There's a problem in stream restoration where post-restoration evaluation and monitoring is neglected, often due to technical, administrative, or financial barriers. This prevents researchers from learning from restoration projects to improve techniques and inhibits the additional intervention that may be needed post-project if a restoration project is not on trajectory to meet its long-term ecological goals. Stream restoration practitioners and regulators need ecological assessment approaches that are affordable, repeatable, objective, and logistically feasible to develop science-based restoration techniques and gain a better understanding of how to improve the ecological health of our waterways.

My innovation takes advantage of widely available, accessible, and affordable drone technology to help make post-restoration monitoring and evaluation more feasible. Drones can be programmed to automatically fly and collect overlapping images throughout a landscape. These images can be processed in special software to create maps and models that capture visual and elevation data across a landscape. Flying a drone and processing the imagery is a pretty straightforward procedure but figuring out how to extract meaningful information from the imagery is where my innovation, which I am tentatively calling "Streamline," comes into play.

Streamline is a GIS-based toolkit that semi-automatically evaluates drone maps and models and provides statistics on the ecological condition of streams, such as the spatial distribution of vegetation, types and counts of habitat features, and the distribution and location of different substrate throughout the stream. All these characteristics have implications for the ecological health of a stream and can be physically demanding and time-consuming to measure in the field from the ground. My Streamline toolkit makes powerful machine learning and remote sensing analytical workflows accessible to stream scientists, consultants, etc. without the steep learning curve. We are also considering other applications of the analytical workflows developed in the toolkit for other biomes and environmental concerns.

How did you first engage with UNHInnovation?

I first found out about UNHInnovation after presenting some preliminary work to my Future of Dams team. I was packaging my methods in this GIS toolkit to disseminate, and a colleague thought that it could have some commercial potential. Dr. Gardner encouraged me in this early stage of my work to reach out to UNHI to see if I should file an innovation disclosure. I remember being overwhelmed at first by the thought of commercializing my research. Maithili Shroff and Matt Simon on the licensing team helped guide me through the disclosure process, and it wasn't nearly as daunting or time consuming as I imagined it to be, even for a busy Ph.D. candidate working on her dissertation. I highly encourage anyone that has an innovation to take that first step and reach out to UNHI.

How did working with UNHInnovation help you?

UNHI was critical in helping me take the first steps towards commercializing my research and learning about different ways of disseminating it in a product or service. The licensing

managers led me though the disclosure process and conducted a commercialization assessment for my work. Through this assessment, I learned that although the Streamline toolkit isn't a candidate for a patent, there is a market for such drone applications. Both Matt and Maithili encouraged me to apply for the UNH I-Corps™ program to learn more about my potential customers. The NSF-funded I-Corps program provides entrepreneurship and customer discovery training to help innovators explore the broader applications and impacts of their research.

Why should students go through commercialization training like I-Corps?

I think it's critical for students to consider the potential of their research beyond academic publications. No researcher wants their work to die on a shelf, and I gained valuable perspective for the practicality of my work through the I-Corps program. Talking to customers helped me validate that what I've been working on is useful and needed in my field and offered insights into potential future work and next steps for my research. Commercialization training is a great way for students to learn about different methods to disseminate and make their research accessible to stakeholders who might be interested in using it, including stakeholders that are beyond the circle of academic peers who would read an article in a journal. Commercialization training can also help students learn how to communicate across different stakeholder groups. The customer discovery process requires that you talk to many people from different backgrounds and of different interests, and you quickly learn about the lives and careers of your potential customers. This expands your understanding of a field beyond your technical jargon and logistics. It helped me see the forest for the trees and placed my research into a bigger picture.

I gained valuable professional development from participating in the I-Corps program. The customer discovery exercise offered me the perfect opportunity to connect with notable professionals and researchers in my field and to learn about different career paths. I was able to talk to professionals in academia, government, consulting, etc. and it was insightful to see what problems each sector deals with on a regular basis. I was also connected with John Gilbert, President of Synchrony Advisors, LLC, who participated as my industry mentor and who taught me how to view my research from a startup perspective. After completing UNH's I-Corps program, I was recommended to apply for the National I-Corps program, which would provide more extensive commercialization training with teams from around the country and $50K in funding to continue to move Streamline forward.

Where are you now in the commercialization process?

I have filed a disclosure and I am currently in the middle of developing the Streamline toolkit. While not a candidate for a patent, we are exploring and brainstorming other applications of the analytical workflows developed in the toolkit and are interested in continuing the customer discovery process after I wrap up my dissertation. I am strongly considering applying for the national I-Corps program, and UNHI is continuing to work with me and help me through my commercialization journey as I think about next steps.