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When Lake Erie Gets Hacked

The Creative and Collaborative Power of Big Data



Written by Ally Fulton
Illustrated by Mikaela Hoffman

From a birds-eye view, a Lake Erie algal bloom looks like something out of a Scooby-Doo movie: eerie green tendrils emanate from the shoreline, swirling around in the southwestern basin. A solar powered drone zooms into your birds-eye field of vision and settles down into the densest algae zone. In this zone, it starts to collect, monitor, and distinguish good algae, such as phytoplankton, a main food source for aquatic life, from bad algae, such as cyanobacteria that produce harmful toxins. Once bad algae have been detected, the drone sends out an alert signal of the location and collects all the bad algae to use for other purposes, such as bio-fuel.

This drone is the brain child of Louis Lane, CTO and founder of Plexnet LLC., a company presenting a project solution to the Cleveland Water Alliance's (CWA) Erie Hackathon Competition. The Erie Hackathon, or Erie Hack, a data and engineering competition launched on February 23, 2017, is bringing together teams of coders, engineers, developers, and water experts of all ages to generate enduring solutions to Lake Erie's biggest pollution problems. Unlike a traditional hackathon—an intense two-day session for programmers to solve problems with technology—Erie Hack extends this concept over multiple months, with the goal to create fully fledged solutions to Lake Erie's environmental issues. The CWA is convinced that Erie Hack's use of big data - mammoth data sets that can be analyzed computationally to find patterns and trends that relate to human interaction and behavior - is the key to solving complex problems like those found in Lake Erie and throughout the Great Lakes region.

"What we're interested in is how can we drive meaningful data to better manage our water systems, and create new innovations, new systems," says Brian Stubbs, Executive Director of the CWA. While the CWA and its partners are the first to hack one of the Great Lakes, the concept of hacking a body of water, or aquahacking, is not new. Many organizations are already engaged in aquahacking projects that gather together individuals committed to applying technological-driven solutions to water problems to catalyze collaboration and knowledge exchange.

Erie Hack was modeled on two aquahacking ventures. The first, aptly called Aquahack, was a Canadian-based project that hacked the Ottawa River and St. Lawrence River over the past three years. Water Hackathon, the second project, was put on by the World Bank in fifteen countries in the same day. Both hacks embodied many of the CWA's values: get environmental experts together to solve big environmental

problems.

The CWA originally spearheaded this project to get Rust Belt innovation to support Lake Erie, the resource that supports the region. Lake Erie is one of the smaller great lakes, but it is the most biodiverse. However, because it is so shallow, it is incredibly vulnerable to environmental fluctuations precipitated and exacerbated by climate change. To establish a clear set of goals for the hack that would address these vulnerabilities, the CWA and NASA Glenn Research Center hosted ideation sessions in Fall 2016. These were huge brainstorm sessions filled with big minds to identify the most pressing challenges facing Lake Erie.

Since the first session, over 150 water and tech organizations fueled the creation of challenge statements to guide the projects developed by teams participating in Erie Hack. Six challenge statements were written and aimed to do the following: mitigate nutrient loading and its environmental impacts, reduce and remediate urban pollution, cultivate resilience in water infrastructure systems, manage aging water infrastructure systems, connect communities to the value of water, and drive the creation of meaningful data. Along with these statements, the CWA encouraged Erie Hack participants to transform problems into opportunities, make new connections, engage grassroots, and promote accessibility.

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The CWA set their sights on the Rust Belt cities' tech communities because they were untapped wells of knowledge. Many of the organizations and individuals working on projects that share the CWA's mission are small and under-resourced or large and bureaucratic, so using big data to identify major priorities seemed to be the most impactful strategy. Thus, the CWA and their major sponsor partners at DigitalC and GE initiated and funded a project that partnered with key institutions in major cities around the lake: Buffalo, Detroit, Cleveland, Toledo, Erie, and Windsor.

In each city, the CWA has identified a key academic partner, a key innovation partner - an accelerator or incubator that has ties to the entrepreneurial community - and a key funding partner that is usually a



community foundation. The three main partners come together around an innovation competition driven by the idea that environmental experts of all different backgrounds, from tech to design, can positively impact water resources.

To be powered by big data, the coordinators behind Erie Hack had to collect and pool the data in one easily accessible place. The CWA gathered information from academic, governmental, and private sources around Lake Erie. All the data lives online in an open access portal, where teams can find resources like the agricultural census for the Great Lakes region, the National Wetlands Inventory, flood maps, water quality portals and much more. These data sets are then used to drive and develop team projects in each of the main cities.

Teams are composed of varying numbers of people of different ages and with all sorts of environmental careers. Waterseed 7, for example, is a team of educators, businessmen, and high school students, focusing on the challenge statement that asks them to connect their community to the value of clean water. To do this, they are creating a virtual reality version of Lake Erie that will both entertain and educate people. Others, like P-Reduce, are a two-person team consisting of an entrepreneur and a scientist looking for a way to reduce nutrient loading in the lake.

When Erie Hack launched at the end of February, each team went through a long development process where they pitched ideas, came together at meet-ups, found new team members and mentors and talked to data organizers. The teams competed at the quarter finals on April 8, 2017 in the four core cities (Buffalo, Cleveland, Detroit, and Toledo). The semi-final was held on April 13 in Detroit, and produced nine teams that will compete in the finals in Detroit on May 2-3. The teams will compete for \$100,000 in cash and prizes, with the first prize receiving \$40,000 cash and \$10,000 value in business development.

Providing capital for big data projects like these is essential in the coming years, with measures like the Great Lakes Restoration Initiative (GLRI) facing huge or complete budget cuts. Initiated in 2010 with the aim to protect and restore the world's largest freshwater system, the GLRI focuses on cleaning up the Great Lakes and educating the next generation about the importance of the Great Lakes ecosystem. These

are both broad goals that, as seen in the challenge statements, Erie Hack shares.

Projects like Erie Hack are integral to the future of the lake. And while Lake Erie may remain the only Great Lake to be hacked, Erie Hack Program Manager Max Herzog, OC '16, says that the CWA "sees this project as laying the groundwork for an ecosystem of entrepreneurs and support institutions who are focused on water-based technologies and economic growth." Herzog speaks to the power of big data projects in their capacity to bring together big and bright minds who are tackling environmental issues on all different fronts. It is in our best interest to keep initiating projects driven by big data that unite artists, scientists, writers, educators, entrepreneurs, coders, techies, and designers to create lasting solutions to complicated problems. ●

