

Civic Geospatial Software for the Web



Robert Cheetham- CEO

Azavea is a B Corporation (a social enterprise) based in Philadelphia. We create civic geospatial software for the web. Our software is used by governments, non-profits, and research organizations for geospatial data analysis and visualization. We build custom apps; develop data analytics; and manage several open source projects (DistrictBuilder, OpenTreeMap, GeoTrellis, and others). All of our work is aimed at applying geospatial technology for social impact and to advance the state-of-the-art through research. We work in many domains, including: elections, urban planning, forestry, water, law enforcement, history, climate change and land conservation.

Interview conducted by: Lynn Fosse, Senior Editor, CEOCFO Magazine

CEOCFO: Mr. Cheetham, what is the concept at Azavea?

Mr. Cheetham: Azavea is a B Corporation that creates civic geospatial software, mostly for nonprofit organizations, municipal government, and academic research. The "B" stands for "benefit", and refers to benefiting workers, the community and the environment. Benefit corporation legislation is now in place in about seventeen or eighteen states in the US. They are a cross between a for-profit corporation and a nonprofit. So we are a for-profit company that operates with a nonprofit-style social mission. Our mission is to apply geospatial technology for civic and social impact and to advance the state-of-the-art through research.

CEOCFO: Why do we want to advance this in the civic area and what is the end goal there?

Mr. Cheetham: Government in the US has an important role in society, but in many cases they do not integrate contemporary technology in the most effective way. Our objective is to improve communities through the application of geospatial technology in a number of different civic domains, from law enforcement and public safety, to land records, water, libraries, archives, museums, and elections. With each one of these domains, we are creating software to help government operate more like the internet - as a platform that can be used to both manage information and more effectively engage citizens in the process of implementing government services.

CEOCFO: Are you working more with cities, counties or states; is there a particular group that has been more interested in your services?

Mr. Cheetham: We mostly create software for municipal and county governments. We also have some work with federal agencies, including several research and development projects.

CEOCFO: What do you understand about the challenges of working with the government that perhaps other companies might not which makes you a better choice for the various municipalities?

Mr. Cheetham: We have more than a decade of experience implementing software for local governments. We understand how the procurement and contracting process works, and we have an understanding of the priorities that local governments have. The people that operate government agencies are custodians of public tax money and they have an obligation to use that the best way possible. That creates what many people consider unacceptable bureaucracy but there are often many good reasons why that bureaucracy is in place, so we have experienced working through those sorts of issues. In addition, many of our staff work at Azavea because of the civic and social impact of our work. As an organization, we are deeply committed to public service, and this is often aligned closely with a government agency's mission.

CEOCFO: Would you give us an example of a common engagement and then maybe something a little more outside the box that you have been able to create?

Mr. Cheetham: Many of our customer engagements begin with a particular problem for which there is no product yet on the market. These professional services projects sometimes evolve into new products. For example, we created a web-based crime mapping system to display crime locations on a map and serve the map on the Internet for internal analytical

use as well as published externally to the general public. Over the course of several years we developed some experience working with law enforcement data as well as some ideas about how the data that law enforcement agencies already have could be used to more effectively operate the agency. That work, now more than ten years old, led to research and development work with Philadelphia police department to experiment with new statistical techniques that would enable them to identify changes in crime patterns more rapidly. We implemented a pilot that was used to improve deployment by district captains. We learned a lot from the pilot, which led us to pursue research and development funding from the National Science Foundation. Out of that came a much more generalized software toolkit called HunchLab, which is able to apply the latest statistics and data science techniques to answer fairly sophisticated questions about geographic patterns in crime. The current version of HunchLab can generate forecasts of where we expect crime to occur on a day-to-day and hour-to-hour basis. For example, today is the third Monday in January and it is 34 degrees outside and the Eagles are not playing, school is in session but it is a federal holiday today. If I am a captain in a police district, I may have four cars, one bicycle and two people on foot for the four to midnight shift, and I want to know where to put those officers in order to maximize their effectiveness, and, further, I want to know what kinds of crimes they can expect occur in their patrol area. That is the kind of question we are trying to answer for police departments. We bring the latest research and technology as well as several years of experience to solving the problem.

CEOCFO: *I would think all law enforcement would be embracing the newer technology. Do you find that is the case or will there always be some reluctance?*

Mr. Cheetham: It depends on the department and the chiefs in the department. This type of technology is known as predictive policing or crime forecasting, and it is fairly new, and many police departments are hesitant to try something that may not have had much research in the field. I think many are interested and many are standing back and waiting. It is no different from the adoption of technology in any other area. There will always be some people that are early adopters and others who are going to wait and see, and others who will follow along several years down the road. We have seen a great deal of interest in this fairly new product, and we are encouraged by the feedback we have had from departments that are taking a look at it.

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CEOCFO: *Do all of your products require customization?*

Mr. Cheetham: Many of our products begin as custom software. So what is now HunchLab began as several different custom software projects for different organizations, as well as research projects with academic researchers. But our products, like HunchLab, are cloud-based, do not require much customization, and are designed to be easily adapted to the particular data sets a police department has. We have similar products around elections (Cicero) and urban ecosystem management (OpenTreeMap). Each of them accommodates some adaptation to local conditions and priorities but otherwise does not require a lot of customization.

CEOCFO: *What is the competitive landscape?*

Mr. Cheetham: It depends on the area in which we are working. There are always competitors. There are competitors for our custom software projects in the sense that there are other firms that do geospatial software development. In our urban forestry work there are one or two other companies that are doing similar types of work and in crime forecasting and predictive analytics there are a couple of companies as well.

CEOCFO: *What makes Azavea stand out?*

Mr. Cheetham: The key things that are our differentiators are in three areas; first we have a dedicated user interface and user experience (UI/UX) design team and all of our projects take a great deal of emphasis on design and ease-of-use for the end user. The second key differentiator on each of our products is we have a ton of experience building high-performance computing techniques to solve tough computational problems very rapidly. Our HunchLab product for example applies machine learning techniques that, if we ran them on a conventional server, it would take many days to process. We have developed ways to break that work up across several dozen machines simultaneously in order to process that in a fast timeframe. User interface, user experience design, high-performance computing, using distributed arrays of cloud computing are the first two differentiators. Then the third is our experience in specific civic domains. In the law enforcement realm we have had more than ten years of experience. I used to work for a law enforcement agency and we have a number of academic research collaborations with crime geographers who are pushing the boundaries in the academic space. In urban forestry we have several years of experience, as well. We have urban ecologist partners as well as implementation partners in many parts of the United States, and we are leveraging the latest techniques developed by the USDA for assessing the ecosystem impact of trees. In elections and politics we have several years of

experience with electoral geography and redistricting. In each of these realms we combine research with design and advanced technology.

CEOCFO: *How do you reach potential customers?*

Mr. Cheetham: In a number of different ways. We write about our work and the results of our research in our company blogs, and we do talks at conferences. We release a lot of our work under open source licenses. Mostly, people find us; we do not have much of a sales team. We do business development work but it is more aimed at education, outreach and sharing our research than it is traditional sales.

CEOCFO: *Your website indicates that employees are encouraged to take on personal research projects and work on the personal research on pro bono projects. Why is that the philosophy?*

Mr. Cheetham: We have always been a fairly employee-driven company. We do a number of things that are different from many companies. We have an open-books policy so the staff will all know where we stand in terms of our revenue and profit. We provide learning and research opportunities. Our ten percent research program is part of that. Each person, after they have been with us for six months, is able to define either a research or a learning objective and spend about a day every couple of weeks pursuing that. There are several reasons behind the program. One is that people who are in creative jobs, like software engineering or data analysis, often have interests that are broader than just the work that they are doing on a day-to-day basis. We want to enable them to pursue those interests as well as learn newer techniques and gain new skills. Secondly, as a company that relies a great deal on advanced technology, we need to remain ahead of our competitors in terms of what we are able to do, and giving people time to look at the adjacent possibilities to the work that we are already doing, is a key part of staying ahead of our competitors. Thirdly, it adds an element of diversity to the work that we do. We not only provide time for people to do this, but we also encourage them to share that work either through writing, presentations, open source, or through periodic show-and-tell sessions that we do internally for people to talk about what they are learning through their research project. This is not time for people to simply spend reading or browsing the Internet; each research or learning project is really focused on pragmatic objectives. If they are exploring the technology, there is some project that they have defined, and each project has some relationship to the company's general work.

CEOCFO: *Do you find this helps you attract top talent and people with the philosophy that you have?*

Mr. Cheetham: Two key things that enable us to attract top talent are our focus on civic and social impact and benefits like the research and learning project. Many people come to us not necessarily because we are a B corporation, per se, but because we are focused on this civic and social impact and a sheer variety of what we are developing, whether it is child early learning, homelessness analytics, law enforcement, land conservation, or urban ecosystems. A third component is the ability to keep learning and continue to push boundaries of what each of our teams is able to do, not only individually but to learn from their colleagues as well.

CEOCFO: *How is business these days?*

Mr. Cheetham: We have grown every year since we have been in business. We do not have any investor capital, so we are a bootstrap company that grows by reinvesting our cash flow and profits back into the business. We are adding new clients and we have been profitable every year we have been in business. We began as a tiny company and me working out of my apartment in Philadelphia and I have grown to about thirty-five people today with customers across the US and, recently, even in other countries. We are growing both domestically and internationally and our investments in R&D are starting to pay off. As a company, we are making a gradual shift from being a completely custom software development company to being one that has a series of cloud based subscription applications that solve specific civic problems. That is enabling us to add new customers at a much faster rate than we would have even a couple years ago.

CEOCFO: *What should our readers remember about Azavea?*

Mr. Cheetham: Azavea is a social enterprise. Social enterprises are new kinds of organizations that are trying to apply the power of business and the market to solving larger problems, such as social and civic community challenges. The B Corporation is new kind of corporation, and it is a way to structure the way we do business in order to have larger impact on society. Our company happens to be doing that in the civic realm but there are similar companies doing this in everything from advocacy (Change.org) to ice cream (Ben and Jerry's) to outdoor clothing (Patagonia). Each of the B corporations is aimed at trying to serve more than just their shareholders but consider a triple-bottom-line: people, planet and profits. I think there is a lot of potential for this relatively new way of operating businesses.

BIO: Robert has an MLA in Landscape Architecture and Regional Planning from the University of Pennsylvania and a BA in Japanese Studies from the University of Michigan. Prior to founding Azavea, Robert served as a software developer and analyst for the Philadelphia Police Department, the University of Pennsylvania, and the City of Philadelphia. Prior to living in Philadelphia, he served as a Coordinator for International Relations in Konan-cho, Japan.

Robert currently serves on the board of the Callowhill Neighborhood Association, as Executive Director of the Japanese Garden Research Network, as an occasional lecturer at the University of Pennsylvania School of Design, and on the Advisory Board for the Masters of GIS and GeoDesign Programs at Pennsylvania State University.

Robert enjoys traveling, hiking, film, food, and reading an eclectic range of topics. He is also an avid listener of audible books, podcasts and music. Snow, rain or sleet, he rides his bicycle to work every day.



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