CASE STUDY

CODE FOR THE CARIBBEAN

This Case Study documents the Code for the Caribbean Fellowship program as a reference to support our partners in other countries in the formation of their own programs. The following is a living document for anyone with the desire to replicate or remix parts of this program for their own purposes. Produced (originally) in collaboration between Code for America's International Programs Manager, Lynn Fine, and the SlashRoots Foundation's Executive Director, Matthew McNaughton, with content from the entire civic tech community.

TABLE OF CONTENTS

BACKGROUND // PAGE 2

THE BEGINNING OF THE FELLOWSHIP // PAGE 3

- FELLOWSHIP STAFF
- GETTING A GOVERNMENT PARTNER ON BOARD
- FELLOWSHIP PARTNERS

FELLOWS RECRUITMENT // PAGE 9

- CANDIDATE REVIEW
- THE SELECTED FELLOWS

TRAINING THE FELLOWS // PAGE 12

- PHASE ONE: GETTING TO KNOW ONE ANOTHER
- PHASE TWO: PROCESS & TECHNICAL OVERVIEWS, PLUS TEAM BUILDING
- TRAINING AT CODE FOR AMERICA, SAN FRANCISCO

MOVING FROM PROBLEM DISCUSSION TO ACTION // PAGE 14

- THE PROCESS
- THE SOLUTION

CULTURE CHANGE IN RADA // PAGE 18

- PROJECT SUSTAINABILITY
- THE CHALLENGES OF COMPREHENSIVE IMPLEMENTATION FOR REAL IMPACT
- MONITORING AND EVALUATION
- BEYOND PRAEDIAL LARCENY IN JAMAICA: TOOL REUSABILITY

PAVING THE WAY FOR STARTUPS: POSITIVE EXTERNALITIES // PAGE 21

LESSONS LEARNED FROM CODE FOR THE CARIBBEAN'S EXPERIENCE // PAGE 22

- HOW IMPORTANT IS FINANCIAL CONTRIBUTION FROM GOVERNMENT
- FUNDRAISING
- THE BRIGADE PROGRAM AS AN ALTERNATIVE PROGRAMMING OPTION

LESSONS FOR CODE FOR AMERICA // PAGE 25

- WHERE THE FELLOWS LIVE
- WORKING AT THE FEDERAL LEVEL

WHAT'S NEXT FOR CODE FOR THE CARIBBEAN? // PAGE 26

ACKNOWLEDGEMENTS // PAGE 27

BACKGROUND

The Caribbean region is comprised of approximately seven hundred islands. Jamaica is the fifth largest island-country in the Caribbean and has a total population of 2.7 million. After securing independence in 1962, the economy grew steadily until the early 1970s when it began to plateau. Since then, burdened by sizeable debts and low advances in productivity, Jamaica has struggled to grow economically. In 2010, the country's GDP (real) growth rate level was the same as it was in 1970.

Agriculture is one of the main industries in Jamaica, employing 18% of the population. However, it represents only 7% of GDP. Most farms are small with 77% of farmland owned by farmers who have two hectares or less of land. Historically, Jamaica's agricultural sector has struggled to compete in the global market. More recently, local producers have come under pressure from natural disasters, high production costs, and the comparatively lower price of imported agricultural goods.

Local farmers are further disadvantaged by high levels of praedial larceny. Praedial larceny is the theft of agricultural produce and livestock. According to the Ministry of Agriculture, "praedial larceny robs the Jamaican agriculture industry of more than $5 billion JMD each year" (Jamaican Observer), equivalent to approximately $5 million USD.

This has far-reaching consequences for the entire island. Praedial larceny destroys livelihoods, creates mistrust in communities, and discourages investment in a sector that accounts for just over 20% of exports. Praedial larceny incidents continue to rise despite government efforts to curb its prevalence.

With these challenges, the Jamaican government urgently needs to devise new approaches to enduring problems. The SlashRoots Foundation, a civic-technology non-profit based in Kingston, Jamaica, was founded to help do so. SlashRoots helps governments, development organizations, and civil society groups better use technology to address social problems endemic to the Caribbean region. After gaining momentum in the region by convening developer communities, SlashRoots collaborated with academia and other open data organizations to host a regional open data conference and code sprint called "Developing the Caribbean" (DevCA). Since its inception in January 2012, DevCA has become one of the largest technology events in the region.

While DevCA has become an excellent platform for raising awareness of open data, civic tech, and the potential of technology to address development challenges, it is difficult to maintain sustainable engagement around these challenges after the event ends. Within this context, and through learning about fellowship programs run by Code for America (CfA) and Code for Kenya, the idea of starting Code For the Caribbean (CftC) was conceived.

THE BEGINNING OF THE FELLOWSHIP

In December 2012, SlashRoots started conversations with Reboot, a social impact firm dedicated to inclusive development and accountable governance, and Mona School of Business and Management (MSBM) at the University of the West Indies about starting a Fellowship program. After initial expressions of support, Matthew McNaughton, Executive Director at SlashRoots Foundation, began working with Jeremy Canfield, a 2011 Code for America Fellow who was a Service Designer at Reboot at that time. Together, they began to draft the CftC Guide for Launching Innovation Fellowships. This Guide was intended to direct the design and implementation of the CftC fellowship pilot, and assist others interested in starting their own Fellowship programs.

Matthew and Jeremy decided that, while the city-structure of the CfA fellowship (in which teams of CfA fellows were paired U.S. cities) made sense for the U.S. context, the CftC structure would have to differ. With a smaller geographic area and a different system of government in the Caribbean, as well as the financial constraints faced by government agencies across the region (CfA's government city partners are responsible for either fundraising or covering $215,000 USD towards the CfA Fellowship program), CftC would focus initially on government agencies within each Caribbean country.

Through CftC, teams of technologists (each including at least one designer and one developer) would partner with a government agency, and use technology and user-driven research processes to improve citizen engagement and the design and delivery of public services. Fellows would be embedded within the government agency, using technology and ethnographic practices to develop solutions to the specific problems faced by that agency. Initially CftC would focus on establishing the program in Jamaica, before branching out to other islands.

Having established a working structure for the design of the CftC fellowship, the SlashRoots team and the MSBM then needed to identify the government agencies with whom the program would partner. CftC wanted to work with forward-thinking government agencies who had already demonstrated commitment to open data and innovation. To make sure the program would be successful, identifying partners trying to address a prevailing issue affecting the effectiveness of their services was a great strategy. The Rural Agricultural Development Authority (RADA) was identified as an ideal government partner.

At that time RADA had already participated in multiple DevCa conference and also collaborated with MSBM on a number of demonstration projects that applied open data and technology to agriculture.

In April 2013, Jeremy Canfield introduced the SlashRoots team to Catherine Bracy, who was the Program Manager for Code for America's "Code for All" international partnership program. Recognizing their common visions and values, Catherine invited CftC to become a founding member of the Code for All international network.

FELLOWSHIP STAFF

I. **MATTHEW MCNAUGHTON,** FOUNDER AND EXECUTIVE DIRECTOR, SLASHROOTS FOUNDATION:

Matthew is an Open Innovation & Development Specialist at the World Bank and co-founder of SlashRoots. In these roles he develops strategies and programs for democratizing innovation and access to information utilizing user-centered design approaches and beneficiary feedback loops to improve public service design and delivery. His work focuses on enabling data-driven decision-making and building local capacity building and tech ecosystem development.

Matthew was instrumental in the design of the Fellowship program, managed CftC partnerships and oversaw the execution of the overall Fellowship Program. He also provided guidance to the fellows in the execution of design research and maneuvering the institutional reform process.

II. **AFIFA HARRIS,** PROGRAM MANAGER:

Afifa completed her PhD in ICT and Development at the Institute for Sustainable Development at the University of the West Indies. She was the CftC Program Manager, and oversaw the Code for the Caribbean Pilot Program with RADA.

Afifa monitored the various stages of the pilot project, from training to research and development, coordinating activities and communication between with the fellows, program stakeholders, and government partners. She was responsible for ensuring that the project timelines were followed and that delivery met the needs of the partner.

III. **DAVID SOUTAR,** DESIGNER IN RESIDENCE:

A graduate of Savannah College of Art and Design, David holds a BFA in Graphic Design, and a MSc in Computer Science at the University of the West Indies. David is currently a Lecturer and Coordinator at the Caribbean Institute of Media and Communications at University of the West Indies and the Assistant Chief Examiner in Digital Media at the Caribbean Examinations Council.

As Designer in Residence, David worked with the fellows during the training, design, and synthesis phases of the project. He introduced the fellows to the process of ethnographic research and design thinking, assisting them through the initial field interview phases when fellows visited farms and communities affected by crop and livestock theft.

IV. **VARUN BAKER,** ENGINEER IN RESIDENCE:

Varun holds a BSc in Computer Science and Electronics from the University of the West Indies, and has been involved in the SlashRoots Developer Community since its early days.

Varun worked alongside the Program Manager and the fellows as they collaborated with RADA to design, develop, and execute action plans which addressed the problem of praedial larceny. He led a number of technical workshops in agile software development during the fellowship training month. Later, he worked closely with the fellows in the program's research and development phases. Varun conducted interviews with several stakeholders along the agriculture value chain to identify patterns in how information, produce, and livestock moves around the Jamaican agricultural ecosystem. Varun also led the software development process for the two apps the fellows created, and he continues to maintain these projects on Github.

GETTING A GOVERNMENT PARTNER ON BOARD

As a result of historic mismanagement of resources and negligible economic growth, Jamaica's debt to GDP ratio stands at almost 140%. Each year, more than 38% of the Jamaican government's annual budget is allocated to servicing debt obligations. This puts a significant strain on the resources that are available to public institutions to fulfill their mandates to the public. This history of public sector mismanagement has led to significant mistrust between government and the citizens it serves.

When determining the best partner for the Fellowship program, the SlashRoots and MSBM team saw an opportunity to build on an existing relationship with a partner agency that shared the values of the program. This agency was RADA, within the Ministry of Agriculture and Fisheries in Jamaica.

RADA serves as the Ministry of Agriculture's main point of contact with farmers and agricultural activities on the ground. RADA provides direct farmer support through its extension services. RADA Extension Officers go into the field to register farmers, provide advice on best practices, inform farmers on opportunities for funding, and receive feedback and complaints. In this capacity RADA is the direct channel through which farmers and government communicate.

A strong relationship existed between SlashRoots, the Mona School of Business and Management, and RADA from their participation in previous DevCa events and regional open data activities. These efforts were mostly supported by the International Development Research Center of Canada the (IDRC). Given the novel and unfamiliar approach of the CftC model to Caribbean context, it was important to build on an existing relationship where trust already existed. It also allowed the fellowship team to move quickly in the implementation of the program instead of investing time in partner recruitment and selection.

To strengthen the trust with RADA while the Fellowship program was still being designed, SlashRoots and MSBM organized a three-day design-thinking workshop with support from the World Bank ICT Sector Unit. Led by Jeremy Weinstein and Jenny Stefanotti from the Stanford Design School on March 19–21, 2013, the workshop topic was the challenge of praedial larceny in agriculture. This initiative introduced design thinking practices to RADA staff and other government officials, and demonstrated how these approaches could be used to improve public services.[1]

At the end of the workshop, Code for the Caribbean was introduced as a means of supporting and enabling adoption of design thinking within RADA. The participating RADA staff were intrigued by the potential impact that a new approach to combatting praedial larceny could have through the targeted use of technology. This was the launching point for formal discussions between SlashRoots, MSBM, and RADA about participating in the CftC pilot program.

I. FORMALIZING THE PARTNERSHIP WITH GOVERNMENT: Once RADA decided to partner with the CftC team, the next step was to assess the contributions that RADA was capable of providing. In the Fellowship program that CfA administers, government partners are responsible for covering half of the total cost of the Fellowship program (an amount that exceeded $215,000 USD in 2014). Given limited financial resources in Caribbean government agencies, made worse by the government's debt burden, the CftC team was hesitant to make similar requests for a yet unproven model.

1 *Design Thinking was described in the publication Creative Confidence as the practice of strategically considering a project's implementation while combining creativity in the evolution of ideas and solutions, rationality when brainstorming how solutions will fit into the problem context, and, of course, empathy for the context of a problem itself.*

The CftC team decided that they would have to demonstrate the results of the program before they could successfully ask for resources to support it. If the pilot was a success, the hope was that RADA would become a champion for future Fellowship cohorts.

CftC offered the Fellowship to RADA at no cost as a means of piloting the program. Instead of financial contributions, they explored various in-kind contributions that the agency could provide. The pilot was implemented through critical grant funding by the IDRC. Technical expertise was provided by MSBM and SlashRoots. RADA provided in-kind contributions of office space, transport in agriculture communities, and staff time.[2]

As discussions arounds partner involvement, project scope, and contributions progressed, it was necessary to formalize the various agreements. It was at this point that the decision was made to begin developing a Memo of Understanding (MOU). The MOU utilized the structure of the City Contract used by Code for America to define the the terms, roles, and resources that each partner would commit to during the pilot.

The next step was to identify a point of contact within the government agency to serve as a primary "champion" for the program. This person would act as the primary coordinator between the CftC fellowship program's leadership team and the government partner. The pilot program champion was Brad Clarke, the Director of Information and Communication Technology at RADA. Brad Clarke had been a consistent supporter and facilitator of previous collaborations with RADA and had a strong vision for how ICT could improve the agriculture sector.

The Program Champion was responsible for convening and chairing the CftC Steering Committee, consisting of 11 representatives from organizations across the Jamaican government, MSBM and the Fellowship team. The cross-organizational committee was charged with stewardship of the fellowship program throughout its life cycle.

In June 2013, the terms of the partnership were finalized. On Friday, June 21, the MOU for Code for the Caribbean was signed.

II. PUBLIC COMMITMENT OF PARTNERSHIP: Publicity was as an important tool to gain more support from the government partner for the program, to increase accountability, and build a shared understanding of project objectives. The CftC worked closely with RADA to establish how the program should be branded and promoted publicly.

The public signing of the MOU between RADA, MSBM and SlashRoots was an important part of making the partnership publicly visible. CftC also made it a priority to discuss the public relations exposure that RADA wanted to receive from the program.

2 *A full list of in-kind contributions is included in the Innovation Fellowship guide created by Reboot and the SlashRoots Foundation.*

FELLOWSHIP PARTNERS

I. MONA SCHOOL OF BUSINESS & MANAGEMENT (MSBM): MSBM is an institutional partner of the SlashRoots Foundation. MSBM and SlashRoots have collaborated since Slashroots was founded. Together, they have worked on a number of initiatives, including the Developing the Caribbean Conferences, the Stanford Design School Workshop, open data policy engagements with agencies within the Jamaican Government, and the development of a number of ICT for Agriculture demo applications for RADA.

   The CftC program benefited from MSBM's established reputation and existing relationships among key stakeholders in Jamaica. As a relatively new organization, it would have been difficult for Slashroots to build this credibility and trust on its own. During the Fellowship, MSBM handled the administrative aspects of managing the program and supported in government relations. This allowed the SlashRoots team to focus their limited resources on the program itself.

II. INTERNATIONAL DEVELOPMENT RESEARCH CENTER OF CANADA (IDRC): In 2010, the IDRC started a Caribbean Open Knowledge program, which became a longer-term initiative to support open knowledge activities across the region. This initiative provided support for the Developing the Caribbean conferences, various open data activities, and the initial engagement with RADA to explore how technology could be used to improve agriculture. The Code for the Caribbean pilot gained support from the IDRC through the collaboration with the MSBM.

III. REBOOT: Reboot is a social impact firm dedicated to inclusive development and accountable governance. The organization helps governments, foundations, and international organizations achieve their goals.

   Since December 2012, Reboot has provided institutional development support to the SlashRoots Foundation through mentorship, training, and resources. Reboot and SlashRoots collaborated to develop the Innovation Fellowship Guide. Panthea Lee, a Principle at Reboot, provided a week-long training workshop to the CftC fellows in preparation for the design research phase of the program.

IV. CODE FOR AMERICA (CFA): CfA is a nonprofit organization devoted to making government work for the people, by the people in the 21st century. The organization builds open source technology and organizes a network of people dedicated to making government services simple, effective, and easy to use.

FELLOWS RECRUITMENT

While the MOU was being formalized, the CftC team prepared to recruit its first fellows. With a better understanding of the program's goals and a secure partnership with RADA, the CftC team was now ready to select fellows whose skills and interests would be best aligned with needs of the program. CftC launched its public "Call for Applications" on May 23, 2013.

The Call for Applications was announced to the SlashRoots Developer Community, shared by MSBM contacts via its alumni mailing lists, and promoted on Facebook and Twitter by both organizations. A Code For the Caribbean website was created that described the Fellowship program, listed the relevant dates, and identified the program's funders and partner organizations. SlashRoots also communicated the program announcement through other channels such a blog post written for the USAID Impact Blog on open data and agriculture.

The recruitment process used focused outreach to gain the attention of top quality applicants. The main goal was not to secure a large quantity of applicants but to target applicants with the necessary skills and expertise. The application was open until the end of June 2013.

CANDIDATE REVIEW

As a pilot Fellowship program, it was important to screen the candidates based on the program's needs. The steps and criteria for selecting candidates included:

I. APPLICATION REVIEW PROCESSES: Members of the SlashRoots Executive Team formed a panel to review and assess all applications.

   The process included review of:

   - General application
     - Resume
     - Cover Letter
     - Work/samples from portfolio
   - In-depth resume screening by Executive Team
   - In-person interviews
     - Designer Questions
     - Developer Questions

II. PRIORITY QUALIFICATIONS: For the first round of applications, CftC had 28 applicants. The CftC identified the roles and skills needed based on the focus of praedial larceny. RADA knew that, given their focus on serving farmers, finding candidates who could build mobile tools would be preferable. In the first round, CftC screened for candidates who met the following criteria:

   A. Designers with experience supporting responsive applications for both mobile web and native applications, with an understanding of the balance between engaging design and bandwidth-constrained mobile experiences.

   B. Developers with experience creating for the responsive mobile web, as well as Android (and/or possibly iPhone, depending on its market share among the class of potential users) and Short Message Service (SMS) based systems, such as RapidSMS and Ushahidi.

III. ADDITIONAL QUALIFICATION CONSIDERATIONS: The CftC team also gave considerable weight to personal characteristics and other qualifications that would make a successful fellow. Concerned with strong team cohesion, they focused on finding applicants with a demonstrated ability to work as team players and to maneuver inside government. They also looked for fellows who demonstrated an ability to independently manage work while knowing when to seek help, and candidates who would be able to deal with setbacks and obstacles with a sense of humor.

THE SELECTED FELLOWS

After the application assessment process were completed in July 2013, the CftC team selected two candidates that reflected the skills and versatility desired to fulfill the goals of SlashRoots and RADA.[3]

I. RORY WALKER

Rory holds a BSc in Computer Science from the University of the West Indies. Chosen to be CftC's Developer Fellow, Rory's passion for problem-solving and development skills, made him an asset to the CftC team. During the research phase, Rory was responsible for maintaining relationships and guiding engagement with the institutional partners, such as RADA, the Jamaica Agricultural Society (JAS), and the Jamaican Police Force. During the building phase, Rory worked with Varun to develop the HarvestAPI and Clip applications

3 A third fellow candidate was selected, but he had to leave the program early during the training period for personal reasons.

Rory brought his experience as a developer and his passion as an innovator to the CftC team. Rory is an avid believer in driving the change to improve working relationships between developers and civic professionals in the Caribbean. He finds every opportunity to hone his technical skills with his love for entrepreneurship and solving problems through the use of technology. For Rory, the startup culture and civic tech mindset is the future of the Caribbean technology ecosystem.

II. STAYSEAN DALEY

Staysean holds a BFA in Graphic Design from the Miami International School of Art and Design. Staysean's eye for design and enthusiasm for regional development made her a true asset to the CftC program. During the research phase, Staysean focused on maintaining relationships and guiding engagement with stakeholders in the three target communities where the research focused. During the building phase, Staysean conducted user interviews, created CLIP and HarvestAPI logos and branding concepts, and produced design recommendations for a mobile version of ABIS (the RADA database).

Staysean supports regional organizations that not only identify issues faced in Jamaica and other Caribbean nations but also make a commitment to developing changes that address those problems. She is a co-founder of one of the only regional stock photography hubs in the Caribbean.

With Rory and Staysean, CftC filled both the designer and engineer roles identified as needed. The fellows' roles changed and evolved throughout the Fellowship, from the research phase to the building phase (more on these phases below). Varun worked alongside the fellows.

The distribution of responsibility across the team was as follows:

- Software development team (Varun & Rory): Produced software in iterations for agriculture API and SMS mobile application.
- Design team (Staysean): Conducted follow-up interviews, created CLIP and HarvestAPI logos and branding concepts, produced design recommendations for a mobile version of ABIS (the RADA database).

TRAINING THE FELLOWS

To start the CftC program the fellows received a three-week training program carried out by the CftC team with support from Reboot, CfA, the World Bank Innovation team, USAID Innovation, the Sunlight Foundation, and the MSBM.

PHASE ONE: GETTING TO KNOW ONE ANOTHER

For the initial component of training, CftC led community-building activities for the fellows. These activities allowed the fellows to get better acquainted as they geared up for more formal components of training.

PHASE TWO: PROCESS & TECHNICAL OVERVIEWS, PLUS TEAM BUILDING

The Fellowship training included workshop introducing technical concepts such as open data, civic tech, design thinking, and domain-specific information about the agriculture sector through visits to RADA and the Kingston market. Workshops helped fellows gain the skills and approaches that would be needed throughout the fellowship and apply them increasingly complex problems and relevant problem areas. Below is a list of the major topics covered throughout the fellowship orientation:

- Fellowship program overview
- Open data and civic tech
- Product development process
- Agile development/software methodology
- User-centered design
- Rapid prototyping
- Applying technology in developing country contexts
- User research and testing
- Lean startup and minimum viable products
- Innovating in government
- Integrating with the community and understanding the context
- Building within reasonably scoped expectations
- Experimental, opportunistic, and flexible practices to development

Training was conducted not only at the start of the Fellowship, but throughout the program. CftC supplemented the Fellowship experience by organizing and recommending informal, fun activities, such as hack-days, social events, and competitions.

Other activities included:

- 20% TIME: 20% of training time for the fellows was set aside to learn or hack on personal projects of their own choosing. A few days before these sessions, the fellows were prompted to think of what they wanted to work on and pitch it to the group so that others could join if they were interested.
- CATERED LUNCH LECTURES: CftC organized lunchtime lectures on relevant topics so that fellows and staff could share ideas and practices. The discussions that evolved out of these lunches have been so valuable that CftC is considering continuing lectured lunches even after the training program has concluded.
- OTHER: Team dinners, outings to sporting or cultural events, and other impromptu activities helped to keep training fun, social, and effective in building a successful team.

TRAINING AT CODE FOR AMERICA, SAN FRANCISCO

In June of 2013 the lead organizers of the Code for the Caribbean program gathered together with the leadership teams of other CfA-inspired Fellowship programs in Germany and Mexico City. The meeting addressed specific program challenges, convening civic technology experts from different countries to connect and share their lessons learned. The agenda for the training can be viewed here.

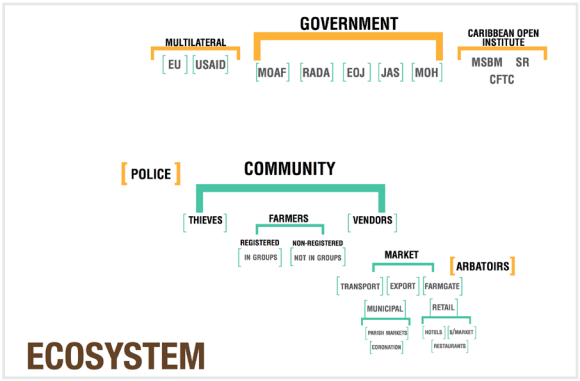
MOVING FROM PROBLEM DISCUSSION TO ACTION

Following the training program, the fellows began the problem immersion and research phase of the program.The fellows were embedded in communities and institutions that were affected by praedial larceny or working to prevent it. The goal was to help the fellows gain a deeper understanding of the problem and context.

The questions the fellows sought to understand included:

- How, where, and when does praedial larceny happen?
- How does it affect communities and how do they respond?
- Who are the organizations involved in the agriculture sector broadly and in policing praedial larceny specifically?
- How do they relate to each other?
- What are the capabilities of the different players in the agriculture value-chain?

As the fellows began their research, they uncovered details and complexities about praedial larceny and prevention efforts. Some of the most interesting insights came from interviewing farmers.



John, a small farmer in the parish of Saint Catherine, describes how praedial larceny has impacted him:

> *I always plant one acre for myself and one acre for the thieves.*

RADA, as the Ministry of Agriculture's "feet on the ground," has first-hand insight into these challenges. However, due to the complexity of the problem and limited resources, the average RADA extension officer monitors up 1,390 farmers. This makes effective oversight and farmer engagement extremely challenging, if not impossible.

Many different agencies attempt to coordinate their work to deter praedial larceny but this is also very difficult. The Ministry of Agriculture, RADA, the Jamaica Agricultural Society (JAS), and the police force all play a role. Private sector entities (such as markets, abattoirs, vendors, producers, and buyers) are also involved, each with unique challenges. During the research process, the fellows determined the relationships between these stakeholders to better understand the overall effort and uncover gaps that could potentially be addressed with technological or programmatic solutions.

Praedial larceny is also complicated from a farmer's perspective. Each farmer is expected to register detailed information about the types of goods produced and average production rates with RADA. The JAS and its staff is responsible for information about commercial agricultural transactions which they gather through a receipt book system. However, these two information systems are not always in sync.

After farmers register with RADA, they are expected to go to the JAS to purchase a receipt book. Whenever a farmer sells goods to someone (a wholesaler, for example), they must provide an invoice using this receipt book. Police officers are expected to check these receipts when they screen individuals carrying agricultural goods at checkpoints. In theory, whoever is transporting goods should be able to show the police officer their invoice or a RADA farmer identification, and the officer should be able to verify whether it is a legitimate receipt. In practice, however, police have inconsistent access to the RADA staff and data they need to make decisions in the field. Often they can't reach anyone to verify the receipt's validity and there is no database that they can access remotely. This makes it difficult for police to distinguish between people who possess stolen goods versus those that have purchased goods legally.

THE PROCESS

Following the training phase, the fellows began the research and design phase of the program. In this phase, the fellows were embedded in communities and institutions that were both affected by praedial larceny and responsible for addressing it. The goal was to gain a deep understanding of the problem context to identify areas where technology could be used.

The fellows undertook a user-focused ethnographic research process. Each day the fellows interviewed farmers, RADA staff, and other stakeholders in the field. They also shadowed farmers, extension officers, and police to understand their experiences.

The fellows analyzed notes from the field interviews to find patterns and insights. The fellows created user stories and profiles, ecosystem maps, as well as service trial maps. These insights were used in brainstorming sessions to develop possible design solutions.

The research phase lasted one month. By consulting with stakeholders, the fellows gained a better sense of the various experiences of users in the agriculture sector with praedial larceny. This gave the team and their partners a deeper understanding of the social, institutional, and political dynamics of the problem.

Through their research, the fellows learned that the parish of St. Thomas had been more effective in combatting praedial larceny than the others by setting up strategic checkpoints to monitor agriculture transport in and out of the parish. However, the efforts of the police were still hindered by the lack of an reliable way to differentiate between stolen and legitimate goods.

THE SOLUTION

The fellows created HarvestAPI and Clip to address this problem.

1. **HARVEST API:** HarvestAPi is a platform that shares agricultural data across government agencies and with the public. It bridges the current data silos between key holders of agricultural data and those that need access to this information to do their jobs.

RELEVANT CONTEXT

Within the Ministry of Agriculture, two databases held the majority of the government's agricultural data: the Agricultural Business Information System, managed by ABIS, and the Jamaica Agricultural Management Information System, managed by JAMIS. ABIS stored information on farmer registration, properties and production data, while JAMIS held price data from market and farm locations across the island. However, with two different agencies managing the databases, there was little integration between the systems. Furthermore, while ABIS stores information on receipt books purchased by farmers, the receipt book initiative is primarily executed by the Jamaica Agricultural Society, another agricultural organization. With this structure, it was difficult for users to access information when they needed it and build applications on the data.

VALUE CREATED

The platform was built using the Django application framework and serves agriculture data as a RESTful web service. It creates a single point of access for information housed across multiple departments and provides the foundation for creating new information services that leverage the data.

Currently, HavestAPI is being used by a local agriculture startup, Agrocentral. Interest is also growing among other agriculture stakeholders, such as the JAS, who may use the platform to develop their own applications. HarvestAPI was also key to allow Clip (described below) to be created.

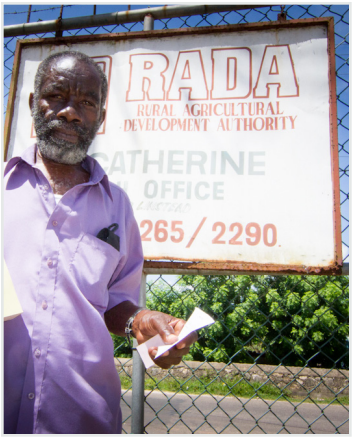
With the launch of Harvest, RADA became the first government agency to release open agricultural data in the Caribbean.

II. **CLIP:** HarvestAPI made Ministry of Agriculture data centralized and easily accessible. The fellows and the RADA team could then develop applications using the data to support stakeholders in the field, such as police who needed real-time information about receipt validity. Clip was developed to allow agriculture stakeholders to access information via SMS on mobile phones.

VALUE CREATED

By using CLIP, a police officer in the field who stopped someone suspected of praedial larceny could immediately input the invoice number into their cell phone and receive a text message confirming whether or not the receipt was legitimate. The message would validate the receipt's validity and report back what types of goods should be associated with that receipt book, making it easier to quickly and accurately identify thieves.

The SMS application was built using PHP and Drupal. RocketSMS was used as the SMS gateway.



CULTURE CHANGE IN RADA

Much of RADA's staff passionate about their public service duties and driven to deter praedial larceny. Many grew up in the countryside themselves. However, with limited resources and inefficient data management, RADA was criticized for not adequately serving farmers across the island. While resource constraints continue to limit the agency's ability to respond to concerns, the work of the Fellowship has launched new conversations around alternative ways of providing these services. The tools that the CftC team and fellows developed are clear, tangible outcomes of the Fellowship program in Jamaica. The cultural change and interest in innovation that the program spawned inside RADA is less visible but potentially more important in the long term.

For example, upon being interviewed about the Fellowship program, a few RADA staff were brought to tears as they spoke of how important these kinds of initiatives could be to furthering their work and RADA's mission to assist farmers. They felt empowered to experiment and to think differently about how to do their jobs and improve outcomes. The CftC team not only developed tools, it catalyzed interest in developing innovative solutions for the agricultural sector.

PROJECT SUSTAINABILITY

The CftC team is confronting many challenges about the future. The financial sustainability of the organization is critical to their ability to implement new programs and maintain existing tools. One option would be for RADA to maintain the projects developed during the Fellowship. The CftC fellows worked side by side with RADA's technical staff throughout the program and RADA gained significant technical expertise from this collaboration, but it is unclear if RADA realistically has the capacity and resources to maintain the tools. CftC and RADA are exploring the possibility of keeping HarvestAPI external to the agency, but integrated with RADA's data so that HarvestAPI can continue to progress as a platform. Part of the reasoning behind this is that other agricultural agencies in Jamaica, the Caribbean, and beyond have also expressed interested in HarvestAPI.

Plans are underway between CftC and RADA to pilot both HarvestAPI and Clip in the parish of St. Thomas, Jamaica in the first quarter of 2015. The JAS has also engaged the CftC team to use data from HarvestAPI for its own applications. Recently, the platform was used in the AgriHack Initiative, a Caribbean agriculture event to get youth interested in agricultural innovation.

THE CHALLENGES OF COMPREHENSIVE IMPLEMENTATION FOR REAL IMPACT

Equipping police officers with tools to differentiate between real and counterfeit invoices is one way the CftC program is helping fight praedial larceny. However, many farmers are not registered with RADA and do not have receipt books to document legitimate sales. In these cases, even a legitimate sale would be difficult to prove. This demonstrates the importance of considering civic technology efforts within the larger context of the problem.

While the development of Clip and HarvestAPI are valuable first steps, these efforts should be accompanied by further institutional reform to address remaining process gaps. CftC made many technical and operations design recommendations throughout the course of the program. For example, they suggested how the data schema between JAMIS and ABIS could be better coordinated. They also suggested options for alternative data collection methods, such as crowdsourcing or partnerships, to overcome resource constraints.

Still, other challenges remain that will take much longer to address. Some of these are organizational challenges internally within RADA and the other agencies. Other external challenges include organized crime, trust in communities, and economic opportunity in rural areas. While CftC's work is helping to move things in the right direction, addressing these broader concerns are critical to curbing praedial larceny in Jamaica.

MONITORING AND EVALUATION

CftC aims to better document praedial larceny baseline metrics before Clip becomes widely used. One option would be to designate a small pilot area and record current praedial larceny levels, before CftC and RADA jointly launch a farmer registration campaign and implement CLIP in the area. While causality could not be determined due to a confluence of external factors, a pilot evaluation of this kind could shed light on the trends in praedial larceny and suggest general impact of the program. Archiving trending data must start now and continue over time in order to measure impact accurately in the future. Without baseline data, monitoring and evaluating the success of the CftC activities will be difficult.

BEYOND PRAEDIAL LARCENY IN JAMAICA: TOOL REUSABILITY

Jamaica is not the only nation that battles praedial larceny or has challenges managing agricultural sector data. Many other Caribbean nations and a number of Asian and African countries struggle with this economic drain too. Other agricultural agencies in the Caribbean also find it difficult to manage their core data assets.

The tools developed by the CftC team could be used by other agricultural agencies with both large and small agricultural datasets to address similar challenges. HarvestAPI could be used as the basis for a new agricultural data standard. This would be particularly useful in a region like the Caribbean where cooperation and data sharing between government agencies is necessary but challenging. A common data standard and data platform would also enable innovators to more easily adapt applications from island to island, which would benefit smaller islands often not thought of as a target market for tools due to their size.

PAVING THE WAY FOR STARTUPS: POSITIVE EXTERNALITIES

In addition to increasing RADA's organizational transparency, opening RADA data spurred an agriculture innovation competition. Out of this competition, three startups have leveraged RADA's open data to create new services and products.

The NODE420 team, a hardware startup from Jamaica, used data in HarvestAPI during the AgriHack Talent Competition and won the overall regional competition. They built a device called a "Node" which is placed on a farm and provides real-time environment analysis. This gives farmers for more accurate weather forecasts and advises them on how to optimize crop productivity.

AGROCENTRAL is a startup that has been called "Jamaica's First Digital Agriculture Clearing House." It provides free agricultural data to agricultural produce sellers who can post their products via the web or SMS. Buyers can communicate with sellers via the web or SMS. Providing a platform for exchange and access to key agricultural information helps farmers maximize their returns. While still in beta, this start-up is seeking VC funding.

CLEVERGROCER is another startup that was able to leverage the data unlocked by the Harvest API. This company helps people from Barbados "shop smarter." The company informs people about the prices of agricultural products before they purchase them, empowering consumers with better price transparency. It also tracks and records expenses, keeps digital receipts, and provides budgetary guidance. While Harvest currently only leverages market price information in Jamaican markets, the company was seeking to incorporate Harvest API's data as a proof of concept to encourage the Agriculture agency in Barbados to open their data in a similar way.

LESSONS LEARNED FROM CODE FOR THE CARIBBEAN'S EXPERIENCE

Throughout the process of building, running, and assessing the Fellowship, CftC has gleaned many valuable lessons in the areas of financial support, replicating the program, and assessing programmatic options.

HOW IMPORTANT IS FINANCIAL CONTRIBUTION FROM GOVERNMENT?

CftC's Fellowship program differed from the CfA Fellowship program in that the cost of the Fellowship was largely covered by external funders with very little financial investment from the government partner. The total funds were also proportionately much lower than CfA's Fellowship program. CfA has traditionally been concerned about adopting this model for two reasons:

I. FINANCIAL INVESTMENT BY THE GOVERNMENT PARTNER INDICATES COMMITMENT TO THE PROJECT: The absence of a sizeable monetary contribution could signal that the government partner is not truly committed to the project and will not engage at the level necessary for project success.

II. THE FELLOWSHIP PROGRAM REQUIRES SIGNIFICANT RESOURCES: Building a Fellowship program is resource-intensive from a financial, time, and human perspective. It is important for the staff managing the program and the fellows to receive sufficient financial support to allow them to focus full-time, or close to full-time, on the success of the project. For example, CfA found that the fellows need technical guidance and invested in a team on CfA staff with senior-level technology expertise. This is a sizable financial investment. CfA has also learned that when fellows commit to involved work projects outside of the Fellowship, the program suffers considerably.

In CftC's case, RADA's commitment to the program was unwavering despite the lack of financial investment. Rather than financial support, the CftC team secured other non-financial resource contributions from RADA. Even without contributing significant funds, RADA was an engaged and active partner. The fact that RADA was not paying for fellows also fostered a collaborative spirit of partnership in which the government partner engaged in active learning and exchange with the fellows. Rather than making specific demands, RADA was very open to seeing what kinds of ideas would emerge from the research and ideation process. This could possibly be because traditional employer-employee dynamics are less prevalent in the absence of financial transactions.

The CftC program did struggle with a lack a resources. Staff were dedicated to the program, but they made substantial personal sacrifices to ensure the success of the project. The

majority of the work on the program was done on a volunteer basis. CftC used a new co-working space to cut down on the costs of opening their own office. Though the program required full time dedication, most CftC staff continued to work additional full-time jobs. A large proportion of the CftC program management staff have technical skills (two developers and one designer) and the time they invested in the program had opportunity costs for their own livelihoods.

It was helpful that the core staff working on the program had a long history of collaboration and that SlashRoots was an established civic technology organization with experienced staff. Despite these strengths, staff sacrificed work-life balance and sleep. Many socially-minded organizations confront struggles similar to those encountered by government: trying to do more with less.

Fellows also sacrificed financial security. The fellows were paid $800 USD per month which is lower than a standard salary in Jamaica.

In CfA's early days, staff worked significantly long hours on a shoestring budget. While this can be maintained for a time, it is not sustainable as a long-term organizational strategy. CfA has moved away from this stage by securing steady funding sources and building teams to ensure that staff feel full supported and have enough time to accomplish their responsibilities. This approach has proved challenging for the CftC team, again indicating the need for context to inform strategy and program design.

FUNDRAISING

Fundraising is a challenge for many countries interested in running a Fellowship program. Learnings from the CftC experience are applicable to other low-income countries. CftC was challenged in the following ways:

- Jamaica and the Caribbean are not a priority country/region for many donors.
- Jamaica does not have a robust "Silicon Valley" technology ecosystem. This limits opportunities for corporate giving from the technology sector.
- Even though wealthy Jamaicans living on the island are impacted by government service delivery, it is challenging to secure funds from wealthy individuals in Jamaica for an unproven initiative.
- Broad fiscal constraints, such as those faced by Caribbean governments, affect willingness and ability for government agencies to pay for fellowship programs when there are pressing needs to ensure basic service delivery.

To overcome these types of issues and build a successful Fellowship program, countries or cities interested in starting a program should ask:

- Are there big tech companies who might want to engage in corporate social responsibility based in the country? If not, what about satellite offices for large companies? Do they manage their own budgets? Do they have specific budgetary allocations for charitable spending? What kinds of programs have they funded in the past and is there overlap with the type of program you would like to implement?

- Are there personal connections that can be capitalized upon?
- Are there wealthy individuals who could be interested in funding a program? Diaspora communities in other countries? What network are the organizers starting out with? (CfA, for example, was fortunate to have a passionate, committed and well-connected board who were instrumental in helping the organization reach its current level of financial operations.)
- Do governments have sufficient funding to pay for fellows? How strict are their procurement policies? Even governments with financial resources might not be able to "procure" fellows. Government internship programs can be repurposed to fund the fellowship program (this alternative was employed by Code for Pakistan to provide funding to fellows working in the province of Peshawar).

THE BRIGADE PROGRAM AS AN ALTERNATIVE PROGRAMMING OPTION

If funding is an insurmountable challenge, regions can start a CfA-style Brigade program instead of the Fellowship program. Brigade programs are citizen volunteer groups with urban development and technology skills who work with local governments to use technology to solve problems in their communities. Brigades are helpful in fostering application sustainability and can be important drivers of innovation and the tech ecosystem. Brigades activate and engage community members to collaborate in making their governments and communities better places. It can also be a productive step towards building support for a future Fellowship program.

Lower income countries such as Jamaica have not typically seen the Brigade program flourish. While SlashRoots has successfully convened a developer community predominantly through regional community and leadership in organizing the Developing the Caribbean conference, many of whom use open source and are somewhat familiar with civic technology, in a country with low income levels there is a significant opportunity cost to volunteering one's time. Income levels and free time for volunteering appear to be inversely correlated. This makes volunteer programs like a CfA-style Brigade more challenging to implement. The CftC team is still evaluating how best to convene and activate the technology community around civic issues.

Overall, the CftC program has demonstrated that the Fellowship program can be successful despite inadequate funding with dedication from staff. However, the Fellowship is a challenging program to implement without the appropriate resources. Some alternatives to consider include leveraging university resources to reduce Fellowship program costs. For example, a partnerships with computer science or policy programs could allow the Fellowship organization to provide academic credits and practical experience in exchange for the fellow's time. Engaging mentors locally and abroad (from diaspora communities, for example) could also be effective.

LESSONS LEARNED FOR CODE FOR AMERICA

CfA's partnership with CftC generated valuable lessons that CfA could apply to the design of their own programs and for future partnerships.

WHERE THE FELLOWS LIVE

As discussed above, the fellows' geographic proximity to their government partner, RADA, contributed to a close and productive relationship based on mutual learning, respect, and shared ownership over the program. It also allowed for useful rapid feedback loops. Having fellows live and work in the region they were developing for made it possible to sustain a user research and design-centered approach throughout the duration of the program. This helped the fellows distill the problem and create a useful, focused tool addressed user needs. While CfA fellows do not live in the communities they are working for, doing the opposite proved very effective for the CftC Fellowship program.

WORKING AT THE FEDERAL LEVEL

CfA does not currently work directly at the federal level. By comparison, Jamaica's geographic size makes the Executive Level feel local. Top level government officials and field-level staff work more closely together. This raised the question of whether CfA should work more directly with state and federal levels of government.

CfA has traditionally engaged with municipal government and, less frequently, with state-level governments because it has found that cities and counties provide the services that have the most direct impact on citizens. CftC's experience showed how working at the federal level could be successful, especially given the authority at the executive level to roll out programs statewide and nationwide. However, given the geographic size of the United States, this would likely provide more challenging at the Executive Level in the United States. CfA could still explore opportunities for federal and state level efforts that would complement its local work.

WHAT'S NEXT FOR CODE FOR THE CARIBBEAN?

The CftC team took a significant step towards addressing one facet of the complex issue of praedial larceny. HarvestAPI has demonstrated its potential to power not only the tool the fellows developed (Clip) but to pave the way for other developers to create applications that can serve the Jamaican community and beyond. For Clip and Harvest API to reach their full potential, they need additional technical work. The SlashRoots and RADA teams have committed to do so and to pilot Clip and HarvestAPI, starting in the first quarter of 2015. CftC is also working with RADA to draft an open data policy.

SlashRoots as an organization is at an inflection point. Through personal sacrifice and with the support of a committed government partner, they have shown what's possible through strong programming alongside committed local partners. They have not only created tools, but initiated an important cultural shift within an important sector. However, limited financial resources and unclear sources of funding leave the future of subsequent Fellowship programs unresolved. The SlashRoots team must now decide how best to shape their efforts to continue to have the impact they strive for in the Caribbean.

ACKNOWLEDGMENTS

This case study would not have been possible without the generous support of the Omidyar Network. We are especially grateful to the organization for its commitment to fostering experimentation and to the thoughtful documentation and analysis of pilot programs such as the partnership outlined in this case study.
The authors of this case study would also like to thank everyone who lent their insight, candor, and reflections to help make this a useful and representative document capturing the successes and challenges of the Code for the Caribbean Fellowship Program. Finally, a sincere thanks to the Code for All community and the partners who make up this international network for their collaboration in making all of our civic technology work better because we are connected and for supporting the development and implementation of this program.