



Caribbean Open Institute Agriculture Digital Services Strategic Initiative

Project Report

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DRAFT

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Executive Summary

As an information-sensitive sector agriculture is heavily influenced by the flow of information among actors along the value chain. Numerous studies have shown that improvements in ICT infrastructure, such as an increased mobile coverage and access to information services, such as real-time pricing and weather data; directly result in improved income of farmers and lowered market prices. These improvements have also been shown to further empower knowledge workers that provide extension services.

Agriculture is an important sector within the Jamaican context. It employs approximately 19% of the population and contributes about 9% of the GDP. In the third quarter of 2016 Jamaica recorded a 2.2% GDP growth rate¹, the strongest growth estimate in real GDP in nine years. The agricultural sector was a major contributor to this with the sector experiencing an estimated real GDP growth of 28% over the previous quarter, with contributions from a double digit increase in the agricultural sector². However, despite the sector's importance it's predominantly rural and resource-constrained environment make it difficult and costly to effectively serve, with the maintenance of updated data records on agricultural activities necessary to most effectively support its development an ongoing challenge.

The Rural Agricultural Development Authority (RADA) and the Jamaica Agricultural Society (JAS) are responsible for providing the Government of Jamaica's primary interface to the farming population. However, resource constraints limit both organizations to an estimated 140 extension and marketing staff to support Jamaica's ~176,000 registered farmers. Despite the best efforts by those on the ground, many farmers fall through the cracks and are unable to get the support they need.³ These differences in scale between the resources available and community need has rendered traditional approaches to data collection and service delivery insufficient to meeting development targets.

This "Agriculture Digital Service" strategic initiative has sought to explore how "openness"

¹<http://jis.gov.jm/positive-outlook-october-december-quarter/>

² <http://www.focus-economics.com/countries/jamaica>

³ <http://jamaica-gleaner.com/gleaner/20130524/lead/lead1.html>

could be applied to assist in overcoming structural constraints that inhibit the scale necessary to more effectively service Jamaica's agricultural community. In pursuit of this objective the strategic initiative is applying emergent best practice in government digital services field--as championed by leading organizations like the United Kingdom's Government Digital Service and City of Buenos Aires's CTO office--and an evolving theory of change for how data collaborations facilitated by shared open infrastructure can enable access to and the creation of high quality agricultural data assets and information services.⁴ The outcomes were that the initiative would aid in the closing of existing data gaps, improve the information available to actors throughout the agricultural sector and explore the implications of an increasing digital and connected public service on data privacy and ownership rights of farmers.

The goals of strategic initiative are defined by three pillars:

- The development of a technology platform that respects RADA's responsibility as custodian of the farmer registry while better aligning with the information needs of data consumers across the Ministry of Agriculture and external to the Government of Jamaica.
- The design of consent models that facilitate active participation of farming communities in decisions about how data about them is being used.
- Influencing the ongoing policy discussion on open data and data privacy within the Government of Jamaica through lessons learned and pilot demonstrations

With the funding support of the International Development Research Centre of Canada under the OD4D program, SlashRoots undertook this Agriculture Strategic initiative with the Rural Agricultural Development Authority. This report provides a summary of the body of work that was undertaken by the SlashRoots team between January 2016 - November 2016. This document provides an overview of the process, findings and lessons learned from SlashRoots' engagement over the project period.

⁴ <https://gds.blog.gov.uk/>

1 Objectives

Project Vision

Jamaica's agricultural industry is recognized as a highly data-driven sector, in which the access to, utilization of, and investment in high quality data assets is prioritized by stakeholders along the value chain. This "data-driven" sector is enabled by partnerships between data consumers and data collectors that increase the quality of information available to the sector and enable the creation of innovative information services. Farmers, the foundation of this agriculture ecosystem, are empowered as informed and active participants in how their information is used.

Mission

The Agricultural Digital Services initiative will contribute to increasing access, utilization and quality of data available to stakeholders throughout the agricultural sector. This mission is defined by three pillars:

- The development of a technology platform that respects RADA's responsibility as custodian of the farmer registry while better aligning with the information needs of data consumers across the Ministry of Agriculture and external to the Government of Jamaica.
- The design of consent models that facilitate active participation of farming communities in decisions about how data about them is being used.
- Influencing the ongoing policy discussion on open data and data privacy within the Government of Jamaica through lessons learned and pilot demonstrations

2 Methodological Framework

2.1 Overview/Definitions – Outcome Mapping Methodology

Outcome Mapping Methodology (OMM) is an approach to planning, monitoring and evaluating project implementation to assess the long-term effects of a particular intervention and measure an intervention's contribution to a complex change process. The ADS strategic initiative is one of four sector-based applied research initiatives that have been commissioned by the Caribbean Open Institute with support from the International Development Research Centre of Canada (IDRC). Each strategic initiative is utilizing the OMM framework to enable cross-sectoral analysis on the impact of Open Data in developing country contexts.

SlashRoots' design process employs a user-centered and agile project methodology to develop contextually suited and effective solutions. Our research methods unearth social and environmental factors that shape the service delivery experience for both beneficiaries and implementers. The OMM provided a framework of intentional design, outcome and performance monitoring and evaluation planning that ensure the desired results are achieved.

2.2 Summary of OMM Intentional Design

Intentional Design

The OMM provides a structure and guidelines for the program's activities on the changes it intends to bring about. The Intentional Design stage outlines seven steps that can be used to provide structure for the program - outlining the vision of the program; mission of the program; boundary partners that the program hopes to influence; the boundary partner's outcome challenges that they could face; progress markers to assess how the program is doing; strategy maps to support the program's outcomes; and organizational practices to create an environment where the program can be effective.

Boundary Partners

A boundary partner is any individual, group or organization that the program hopes to influence (Earl et al, 2001). Building on prior collaborations with RADA and other agricultural stakeholders, the below boundary partners were defined through a project inception workshop held with the project counterparts within the RADA IT team:

1. The Rural Agricultural Development Authority (RADA)
2. Data Consumers

3. Farmers
4. Praedial Larceny Prevention Unit & Officers
5. The Marketing Division of the Ministry of Agriculture
6. Ministry of Science, Energy & Technology

Outcome Challenges and Progress Markers

An outcome challenge describes how the behaviour, relationships, activities, or actions of the Boundary Partners will change if the program is extremely successful (Earl et al, 2001). Outcome challenges for the BPs describe the ultimate goal the program is working towards; and progress markers for each outcome challenge are established to provide intermediate target goals throughout the program.

Boundary Partner	Outcome Challenge	Progress Markers	
RADA	This program intends to see RADA adopt the ADS platform as their primary platform for sharing information from the farmer registry and become a GOJ advocate for the design principles that enable the platform. They would see farmers as owners of their information and seek to integrate into their operations training to empower farmers on accessing and participating in the usage and sharing of information with third-parties.	Expect to See:	<ul style="list-style-type: none"> - Participate in and facilitate the ADS Design Process - Appoint a Focal Point to enable project execution - Share information that will enable the development of the ADS platform
		Like to See:	<ul style="list-style-type: none"> - Actively participate in the development of the ADS platform through sprint planning, code contributions and user testing sessions - Integration of ADS platform with ABIS farmer registry - Execution of ADS pilot with target users - Development of training module for farmers to access their information - Adoption of the ADS platform as a mechanism for sharing farmer registry information - Adoption of new farmer consent principles by organization

		Love to see:	<ul style="list-style-type: none"> - Expansion of ADS pilot with roadmap for full adoption nationally - Utilization of ADS platform for development of all RADA applications - Adoption of ADS design process and/or technologies into internal team's process - Integration of farmer training on accessing information into farmer registration - Advocacy of the ADS principles and design process to other GoJ and agricultural stakeholders
Marketing Division, Ministry of Agriculture	The program intends to see Marketing Division of the Ministry of Agriculture adopting the ADS platform as their preferred approach to storing and publishing market price information. They would integrate the ADS platform into their data collection process and promote the platform to stakeholders who want access to market price information	Expect to See:	<ul style="list-style-type: none"> - Participate in and facilitate ADS Design Process - Share information that will enable the development of the ADS platform
		Like to See:	<ul style="list-style-type: none"> - Actively participate in the development of the ADS platform through user testing sessions - Integration of ADS platform with JAMIS system - Participation in ADS pilot with target users
		Love to see:	<ul style="list-style-type: none"> - Expansion of ADS pilot with roadmap for full adoption nationally - Promotion of ADS as

			mechanism for accessing information on JAMIS price information
Praedial Larceny Unit & Officers	The program intends to see Praedial Larceny Prevention Unit & Officers integrating the ADS-enabled tools into the Praedial Larceny strategy. Officers would receive training material on how to use the ADS-enabled tool (Clip) to be better equipped to make informed decisions while in the field. The PLPU would use it to support its operations.	Expect to See:	<ul style="list-style-type: none"> - Participate in and facilitate ADS Design Process as one of the target users - Share information on the PL operations that will inform the development of the ADS platform and the Clip application
		Like to See:	<ul style="list-style-type: none"> - Actively participate in the development of the ADS platform through sprint planning and user testing sessions - Execution of Clip pilot with target user group - Development of training module for officers participating in the pilot - Adoption of the Clip application as part of PL prevention strategy
		Love to see:	<ul style="list-style-type: none"> - Expansion of Clip pilot with roadmap for full roll out nationally - Integration of ADS-enabled tools in PL prevention strategy, operations, and officer training - Advocacy of the ADS principles and design process to other GoJ and agricultural stakeholders
Farmers	The program intends to see Farmers as informed active participants in how their information is utilized by the Government and third-party services. Farmers will	Expect to See:	<ul style="list-style-type: none"> - Participate in ADS Design Process as one of the target users - Give feedback on ADS prototypes during user feedback sessions and ADS

	<p>be able to utilize the ADS tools to learn about and contribute to how data is utilized by various service providers.</p>		<p>pilots</p>
		<p>Like to See:</p>	<ul style="list-style-type: none"> - Active contributors in the design and implementation of consent model - Participants in pilot training on accessing information - Increased awareness of channels through which they can request information from farmer registry
		<p>Love to see:</p>	<ul style="list-style-type: none"> - Empowered to request information about themselves stored in farmer registry - Advocates for consent model being adopted in more GoJ services
<p>Data Consumers</p>	<p>The program intends to see Data Consumers recognizing the ADS platform as a trusted source of agricultural data and subsequently integrating the platform into their products, services and internal decision-making. Consumers will also adopt the principle of a data commons and choose to contribute relevant data back the shared data resource.</p>	<p>Expect to See:</p>	<ul style="list-style-type: none"> - Participate in ADS Design Process as a target users - Contributing user needs and expectations on RADA's agricultural data
		<p>Like to See:</p>	<ul style="list-style-type: none"> - Providing ongoing feedback on the implementation of the ADS platform through user testing sessions - Participating in the ADS pilot by providing feedback on the platform's design, usability and documentation - Increased utilization of RADA's agricultural data
		<p>Love to see:</p>	<ul style="list-style-type: none"> - Integrating the ADS platform into their services - Creation of new services based on the data available through ADS - Willingness to contribute relevant data back to the ADS

			<p>platform to assist with filling data gaps</p> <ul style="list-style-type: none"> - Advocates for the continued development and expansion of data shared by RADA through the ADS platform and across the GoJ
Ministry of Science, Energy & Technology (MSET)	The ADS program intends to see MSET recognizing the ADS platform and design principles as a key reference in the development of the Government's data privacy legislature. They would advocate for greater citizen participation and influence in how their information is being used and shared.	Expect to See:	<ul style="list-style-type: none"> - Providing context on existing legislation that relates to data privacy, open data and electronic transactions
		Like to See:	<ul style="list-style-type: none"> - Sharing current thinking and existing drafts of relevant legislature - Take an interest in the findings and development of the ADS platform
		Love to see:	<ul style="list-style-type: none"> - Incorporate lessons learned into policy framework under development - Inviting of ADS team to participate in other relevant discussions around data privacy, consent and digital identity - Adoption of ADS principles and citizen consent models as references for GoJ's approach to data privacy

3 Methodology

SlashRoots utilizes an applied ethnography design process that focuses on understanding the needs, behaviors and challenges of users, and the service delivery context in which they operate. Problem discovery, as this phase is called, involved the SlashRoots research team executing through desk research on the best practices in

designing digital services, the Jamaican policy environment and exploration of the existing ecosystem that surrounds the collection and utilization of agricultural data.

The data collection methods that were used include:

- Desktop Research and Documentation Reviews
- In-depth Interviews
- Data Access Service Trial
- Workshops

The problem discovery phase was guided by four key lines of inquiry. They are detailed below:

Theme 1: Data Usage & Access

- **What are the factors that enable or inhibit the usage of and trust in agricultural datasets and data sources**
- Who are the current major consumers of agricultural data and through which channels do they access this information?
- What are the factors that encourage or disincentivize the usage of agricultural data among consumers?
- How is access to agricultural data managed by different data custodians? What tools exist and are utilized by data custodians?

Theme 2: Data Collection

- **What data processes, standards and guidelines inform the collection of data in different data custodians?**
- What resources and/or challenges exist around maintenance and sustainability of data collection activities?
- What are the channels through which agricultural data is collected?
- What standards or schemes are utilized in the collection of information? Who maintains the standards? Is there a single authority responsible for the maintenance of agricultural schemas and standards?
- How is information validated by information custodians?

Theme 3: Data Privacy & Ownership

- **What principles, policies and legal frameworks guide the sharing of data generally, and private citizen data specifically in the Jamaican context?**
- Who should be able to access a citizen's personal information? And in what circumstance? What requirements exist for service providers who share citizen information?
- How does one manage "consent" in digital services among low literacy and limited connectivity environments? What facilities around identity exist or are required?
- What are the views of data owners on the sharing of their information?

Theme 4: Data Governance & Interoperability

- **What barriers exist that enable or inhibit data interoperability between custodians of agricultural data?**
- How are the leading institutions approaching digital governance and data as infrastructure?
- What common data standards and channels exist to support data sharing interoperability?
- Is there a willingness to adopt shared data standards and contribute to an open data commons

3.1 Program Strategies

Desktop Research and Documentation Reviews

Slashroots desktop research and documentation reviews included:

- Review of the Jamaican policy environment in ICT and Agriculture policy. This included reviews of Electronic Transaction Act, Cybercrimes Act, Access to Information Act, Praedial Larceny Act.
- Content and consent model analysis of <https://www.gov.uk/> and <http://www.buenosaires.gob.ar/> websites to get a better understanding of a consent model that would facilitate the sharing of farmer information while still protecting their privacy
- Technical material reviews of Registers, OpenConnect, Mean Stack to get a better understanding of the technical approach that would be taken

In-depth Interviews

In-depth interviews was another method used for information gathering. Slashroots interviewed 23 stakeholders that fall under the following stakeholder groups:

- RADA - 3 respondents
- Other Government of Jamaica (e.g. Praedial Larceny Prevention Unit, Ministry of Agriculture) - 6 interviews
- External Data Consumers (e.g Entrepreneurs) - 3 interviews
- Policy Makers - 4 interviews
- Data Owners (e.g Farmers) - 4 interview
- Key Informants (Argentina Digital Service Team) - 3 respondents

Data Access Service Trial

As a follow up to the challenges accessing agricultural data that were identified in the in-depth interviews, the research team undertook a service trial to explore the experience associated with fulfilling information requests for “high priority” data needs. These agricultural needs included agricultural market information, historic & predictive information and technical knowledge. Please see the Annex for a more in depth overview

of the data needs identified.

The team utilized both online (via the ABIS, JAMIS and RADA's website) and offline channels (phone calls with staff at Five (5) RADA Parish offices) to replicate the experiences of the typical information request.

Phone data requests focused on RADA's Head Office and Four(4) Parish Offices, which our researchers were referred to during data requests. Key observations included:

- Personal information on farmers (contact lists) and production information are accessible via phone
- There was high variability in the responses to the same data requests by different RADA staff
 - For example, a farmer/potential buyer might have to make several calls/be redirected to several departments to resolve a marketing query.
- RADA Staff were willing to assist information requests and advise callers on where they thought they could receive information desired.

This service trial unearthed two main things:

- RADA is willing to provide information (if they have it on-hand), but staff is at times are unsure of where to find this information or who they should direct a caller to. This led to callers being directed to multiple individuals before a request is met.
- Improving navigation/searching mechanisms and creating a central location for information would improve accessibility of information.

Workshops

Inception workshop: The SlashRoots team conducted an Inception workshop with the RADA technical team at the beginning of the research process to define key research questions, align on project goals and identify initial data user needs that prompted the need for the development of the Harvest platform.

Synthesis Workshop: Slashroots conducted a synthesis workshop at the end of the problem discovery phase to: share research progress, discuss design recommendations identified through research synthesis, and identify the next steps for project implementation. An overview of the design recommendations can be found in the Annex

Release Planning Session: Based on the design recommendations from the problem discovery phase, Slashroots held a release planning session with RADA to prioritize the feature sets and identified the focus areas for the HarvestAPI MVP. that was to be tested in a closed beta with data consumers.. The HarvestAPI MVP Feature list can be found in the Annex.

3.2 Strategy Map

The strategy map supports the achievement of project outcomes through the

identification of causal, persuasive and supportive project activities. These activities are matched with respective outcome challenges.

<p>RADA Outcome Challenge: This program intends to see RADA adopt the ADS platform as their primary platform for sharing information from the farmer registry and become a GOJ advocate for the design principles that enable the platform. They would see farmers as owners of their information and seek to integrate into their operations training to empower farmers on accessing and participating in the usage and sharing of information with third-parties.</p>			
Strategy	Causal	Persuasive	Supportive
<p>STRATEGIES AND ACTIVITIES AIMED AT A SPECIFIC INDIVIDUAL OR GROUP</p>	<p>Inception Workshop;</p> <p>Creation of ADS Platform;</p> <p>Provide documentation and manuals detailing the use of the application program interface.</p>	<ul style="list-style-type: none"> - Design Research Synthesis Presentation / Report - User Feedback sessions; - Collaborative sprint planning and development of ADS platform; - Knowledge sharing around agile and iterative development process; - Knowledge sharing on emerging trends and methodologies around government digital services. -Release planning session 	<p>Provide ongoing technical assistance.</p>
<p>STRATEGIES AND</p>	<p>- Publication of</p>	<p>- Participation in</p>	<p>- Joining GODAN</p>

ACTIVITIES AIMED AT INDIVIDUAL OR GROUP'S ENVIRONMENT	platform and registry dictionaries (e.g crop); - Creation of RADA policy around agricultural data sharing and usage	GODAN Conference; - Publish lessons learned on enabling digital services and addressing data gaps in the agricultural sector.	network; - Engagement with MSET and other GoJ stakeholders around data privacy and lessons learned
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Marketing Division, Ministry Of Agriculture Outcome Challenge: The program intends to see **Marketing Division of the Ministry of Agriculture** adopting the ADS platform as their preferred approach to storing and publishing market price information. They would integrate the ADS platform into their data collection process and promote the platform to stakeholders who want access to market price information

Strategy	Causal	Persuasive	Supportive
STRATEGIES AND ACTIVITIES AIMED AT A SPECIFIC INDIVIDUAL OR GROUP	Creation of ADS Platform; Provide documentation and manuals detailing the use of the application program interface.	- Design Research Synthesis Presentation / Report - User Feedback sessions;	- Ongoing technical assistance
STRATEGIES AND ACTIVITIES AIMED AT INDIVIDUAL OR GROUP'S ENVIRONMENT	- Publication of platform and registry dictionaries (e.g crop); - Creation of RADA policy around agricultural data sharing and usage	Pilot workshop with key stakeholders	- Engagement with MSET and other GoJ stakeholders around data privacy and lessons learned

Praedial Larceny Unit Outcome Challenge: The program intends to see **Praedial Larceny Prevention Unit & Officers** integrating the ADS-enabled tools into the Praedial Larceny strategy and operations. Officers would receive training material on how to use the ADS-enabled tool to be better equipped to make informed decisions while in the field. The PLPU would use it support its operations.

Strategy	Causal	Persuasive	Supportive
STRATEGIES AND ACTIVITIES AIMED AT A SPECIFIC INDIVIDUAL OR GROUP	Build mobile/web application to view farmer related information. Provide resources for training of officers	In-field pilot of Clip application by officers Ongoing participatory user sessions	Provide ongoing technical assistance for adoption
STRATEGIES AND ACTIVITIES AIMED AT INDIVIDUAL OR GROUP'S ENVIRONMENT	Integration of training into PL Officer training	Pilot workshop with key stakeholders	Support budgeting and planning for integration of application into normal operations of the security forces

Farmer Outcome Challenge: The program intends to see **Farmers** as informed active participants in how their information is utilized by the Government and third-party services. Farmers will be able to utilize the ADS tools to learn about and contribute to how data is utilized by various service providers.

Strategy	Causal	Persuasive	Supportive
STRATEGIES AND ACTIVITIES AIMED AT A SPECIFIC INDIVIDUAL OR GROUP	Collaborative design of data access and consent models	Ongoing user feedback session on consent model prototypes Training in accessing information about their activities.	Training of relevant RADA extension officer staff

STRATEGIES AND ACTIVITIES AIMED AT INDIVIDUAL OR GROUP'S ENVIRONMENT	Development of visual resources to support accessing services	Participation in project findings workshop to share experiences	Closer partnership between farmer and RADA to define next steps on how farmer information can be used
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Data Consumers Outcome Challenge: The program intends to see **Data Consumers** recognizing the ADS platform as a trusted source of agricultural data and subsequently integrating the platform into their products, services and internal decision-making. Consumers will also adopt the principle of a data commons and choose to contribute relevant data back the shared data resource.

Strategy	Causal	Persuasive	Supportive
STRATEGIES AND ACTIVITIES AIMED AT A SPECIFIC INDIVIDUAL OR GROUP	Platform for accessing RADA farmer registry and price information	Ongoing user feedback session on consent model prototypes	Documentation and resources (examples, developer list) for utilizing the ADS platform
STRATEGIES AND ACTIVITIES AIMED AT INDIVIDUAL OR GROUP'S ENVIRONMENT	Publication of MoA data dictionaries and reference guides	Participation in project findings workshop to share experiences	Data Consumer User Groups and Feedback channels

Ministry of Science, Energy & Technology Outcome Challenge: The ADS program intends to see **MSET** recognizing the ADS platform and design principles as a key reference in the development of the Government's data privacy legislature. They would advocate for greater citizen participation and influence in how their information is being used and shared.

Strategy	Causal	Persuasive	Supportive
STRATEGIES AND ACTIVITIES AIMED AT A SPECIFIC	Participation in ADS research	Design Research & Project Findings Report	Ongoing dialogue on implications of lessons learned for

INDIVIDUAL OR GROUP			data privacy legislature
STRATEGIES AND ACTIVITIES AIMED AT INDIVIDUAL OR GROUP'S ENVIRONMENT	Design Recommendations and Analysis of Policy Environment	Participation in project findings workshop to share experiences	Collaboration with RADA and SlashRoots to expand scope of research and project scope

3.3 Organizational Practices

Organizational practices, which are influenced by the outcome challenges, are put in place to create an environment where the program can be effective. They describe a well-performing organization that has the potential to sustain change interventions over time and represent activities that enable the program to remain relevant, innovative, sustainable, and connected to its environment (Earl et al, 2001). The OMM provides eight organizational practices that encourage key action to take place:

1. Prospecting for new ideas, opportunities, and resources
2. Seeking feedback from key informants
3. Obtaining the support of your next highest power
4. Assessing and (re)designing products, services, systems, and procedures
5. Checking up on those already served to add value
6. Sharing your best wisdom with the world
7. Experimenting to remain innovative
8. Engaging in organizational reflection

Key activities for the organizational practices that will be done for the ADS project are outlined below:

Organizational Practice	Key Action
1. Prospecting for new ideas, opportunities, and resources	The ADS team, as part of the research process will review, document and engage with the teams at the forefront of the government digital services practice. Key boundary partners will be included in this dialogue
2. Seeking feedback from key informants	Iterative and participatory design are core tenants on the project methodology. Boundary partners and strategic

	partners will be actively engaged throughout the development process to provide feedback on the system as it is developed to influence its design.
3. Obtaining the support of your next highest power	The Director of RADA will be interviewed as part of the design process and invited to participate in key project milestone activities such as the findings workshop. Similar courtesies will be extended to partners at the Ministry of Science, Energy & Technology
4. Assessing and (re)designing products, services, systems, and procedures	Regular feedback sessions will be organized throughout the design phase, such as at the end of sprints, as well as at the end of project milestones, such as the Synthesis and Pilot review workshops
5. Checking up on those already served to add value	Boundary partners will be invited to participate in user feedback sessions and project review workshops
6. Sharing your best wisdom with the world	Project activities documented and disseminated through blogs and presentations through regional and international conferences. Will work with boundary partners to identify priority events.
7. Experimenting to remain innovative	As part of the phases of the project team's design process staff are afforded time to experiment and explore different approaches to implementing target services as well as securing feedback from boundary partners
8. Engaging in organizational reflection	The project implementation methodology includes various touch points for reflection on implementation of activities. This includes, weekly synthesis sessions, sprint retrospectives, user feedback sessions and workshops

4 Boundary Partner Outcomes

For this phase of the project, three boundary partners were the primary focus - RADA, Data Consumers and the Praedial Larceny Unit. To assess the progress made towards the outcome challenges, an outcome journal was used to keep track of the progress markers. See tables below to see the outcome journals for Rada, the Data Consumers

and the PLU.

4.1 RADA Outcome Journal

Outcome Journal		
Work Dating from/to		
Contributors to Monitoring Update: SlashRoots		
<p>Outcome Challenge</p> <p>This program intends to see RADA adopt the ADS platform as their primary platform for sharing information from the farmer registry and become a GOJ advocate for the design principles that enable the platform. They would see farmers as owners of their information and seek to integrate into their operations training to empower farmers on accessing and participating in the usage and sharing of information with third-parties.</p>		
<p>Low = means that actions have been against the behaviour or the goal has been ignored</p> <p>Medium = means that the partner showed interests / support for the specific behavior but not all actions supported (negative actions, consistency, depth of engagement) its goal</p> <p>High = means that specific actions have been taken in favour of the outcome and the BP operated effectively throughout project execution</p>		
Expect to See RADA		Who?
LMH		
M	Participate in and facilitate the ADS Design Process	Rada IT Team
M	Appoint a Focal Point to enable project execution	RADA Product Owner
H	Share information that will enable the development of the ADS platform	RADA IT Team
Like To See RADA		

LMH		
H	Actively participate in the development of the ADS platform through sprint planning, code contributions and user testing sessions	RADA IT Team
M	Integration of ADS platform with ABIS farmer registry	RADA IT Team
M (Work in progress)	Execution of ADS pilot with target users	RADA
N/A	Development of training module for farmers to access their information	
M (Work in progress)	Adoption of the ADS platform as a mechanism for sharing farmer registry information	RADA
L	Adoption of new farmer consent principles by organization	RADA IT Team
Love to See RADA		
LMH		
N/A	Expansion of ADS pilot with roadmap for full adoption nationally	
M (Work in progress)	Utilization of ADS platform for development of all RADA applications	
L	Adoption of ADS design process and/or technologies into internal team's process	
N/A	Integration of farmer training on accessing information into farmer registration	
N/A	Advocacy of the ADS principles and design process to other GoJ and agricultural stakeholders	
Description of Change Through the execution of the project, RADA has developed a greater appreciation		

of the principles (theory of change) that motivate an open platform approach to supporting innovation in the agriculture sector and increased access, usage and quality of data available to its stakeholders. They have become increasingly accommodating of necessary data integration between the technology systems and have shown greater interest in the utilization of the platform for their own services.

Contributing Factors and Actors

RADA’s ongoing participation in the design process, including interactions with a tangible product through stages of development, has assisted in increasing their understanding of the platform approach to supporting innovation. The close collaboration between the teams has also increased trust, which has help ease early concerns around integration with the Farmer registry.

Having a single product focal point, responsible for keeping the RADA IT team informed, has also helped to drive ownership of the project, ensuring consistent engagement and support in removing some impediments.

Sources of Evidence

- Release Planning Workshop
- Meeting Minutes
- BETA Pilot

Unanticipated Change

The project was impacted by significant changes in the RADA organizational context that affected key project stakeholders. Two key examples of these changes included a national election that resulted in a change of Government that resulted in a restructuring of the Ministry of Agriculture and RADA board and the retiring of the RADA IT Director, who had been a key project sponsor for the agriculture open data work. Both of these changes resulted in delays as the change process occurred and required building trust with new partners.

Lessons/Required Program Changes / Reactions:

Project engagement has focused on the RADA IT team. However, key issues, such as data collection quality control and organization privacy practices, have implications beyond IT policy and impact the broader organization. As a result, stakeholders beyond the RADA IT team should have been engaged to project meetings to inform them of project activities and considerations; secure their buy-in as collaborators; and

gain their support in convening a broader conversation across the organization.

4.2 Data Consumers Outcome Journal

Data Consumers Outcome Journal		
Work Dating from/to		
Contributors to Monitoring Update: SlashRoots		
<p>Outcome Challenge</p> <p>The program intends to see Data Consumers recognizing the ADS platform as a trusted source of agricultural data and subsequently integrating the platform into their products, services and internal decision-making. Consumers will also adopt the principle of a data commons and choose to contribute relevant data back the shared data resource.</p>		
<p>Low = means that actions have been against the behaviour or the goal has been ignored</p> <p>Medium = means that the partner showed interests / support for the specific behavior but not all actions supported the target project outcomes (negative actions, consistency, depth of engagement) its goal</p> <p>High = means that specific actions have been taken in favour of the outcome and the BP operated effectively throughout project execution</p>		
Expect to See Data Consumers		Who?
LMH		
H	Participate in ADS Design Process as a target users	Entrepreneurs
H	Contributing user needs and expectations on RADA's agricultural data	Entrepreneurs
Like To See Data Consumers		
LMH		
H	Providing ongoing feedback on the	Entrepreneurs

	implementation of the ADS platform through user testing sessions	
H	Participating in the ADS pilot by providing feedback on the platform's design, usability and documentation	Entrepreneurs
N/A	Increased utilization of RADA's agricultural data	
Love to See Data Consumers		
LMH		
M (Work in progress)	Integrating the ADS platform into their services	
	Creation of new services based on the data available through ADS	
H	Willingness to contribute relevant data back to the ADS platform to assist with filling data gaps	Entrepreneurs
	Advocates for the continued development and expansion of data shared by RADA through the ADS platform and across the GoJ	
Description of Change		
Contributing Factors and Actors Frequently engaging the entrepreneurs to provide their feedback throughout the project		
Sources of Evidence Meeting Minutes User Interview Notes		

Unanticipated Change
<p>Lessons/Required Program Changes / Reactions:</p> <p>The entrepreneurs want to be more involved in opportunities to fill the data gaps. While critique and skepticism about the quality of data in ABIS remained high, stakeholders were understanding of the challenges faced by RADA and keen to partner with RADA to support data collection, especially if this potentially meant that they could have access to more agricultural data.</p> <p>However, key data needs, such as access to personal information are reliant on RADA clarifying its data access and privacy policy.</p> <p>External partners who collect agricultural data represent an underutilized resource that RADA could level to augment its own data collection efforts.</p>

4.3 Praedial Larceny Prevention Unit & Officers

Outcome Journal
Work Dating from/to
Contributors to Monitoring Update: SlashRoots
<p>Outcome Challenge</p> <p>The program intends to see Praedial Larceny Prevention Unit & Officers integrating the ADS-enabled tools into the Praedial Larceny strategy. Officers would receive training material on how to use the ADS-enabled tool (Clip) to be better equipped to make informed decisions while in the field. The PLPU would use it to support its operations.</p>
<p>Low = means that actions have been against the behaviour or the goal has been ignored</p> <p>Medium = means that the partner showed interests / support for the specific behavior but not all actions supported (negative actions, consistency, depth of engagement) its goal</p> <p>High = means that specific actions have been taken in favour of the outcome and the BP operated effectively throughout project execution</p>

Expect to See PLPU		Who?
LMH		
M	Participate in and facilitate ADS Design Process as one of the target users	PLPU Coordinator, Officer
M	Share information on the PL operations that will inform the development of the ADS platform and the Clip application	PLPU Coordinator, Officer
Like To See PLPU		
LMH		
M (in-progress)	Actively participate in the development of the ADS platform through sprint planning and user testing sessions	PLPU Coordinator, Officer
N/A	Execution of Clip pilot with target user group	
N/A	Development of training module for officers participating in the pilot	
N/A	Adoption of the Clip application as part of PL prevention strategy	
Love to See PLPU		
LMH		
	Expansion of Clip pilot with roadmap for full roll out nationally	
	Integration of ADS-enabled tools in PL prevention strategy, operations, and officer training	

	Advocacy of the ADS principles and design process to other GoJ and agricultural stakeholders	
Description of Change		
Contributing Factors and Actors		
Sources of Evidence		
Unanticipated Change		
Lessons/Required Program Changes / Reactions: -		

5 Project Outputs and Dissemination

Key Research Insights

This section summarizes key observations from SlashRoots' engagement with RADA and other data ecosystem stakeholders. The research team focused on data needs of key categories of stakeholders, the capabilities and systems that support data collection and data sharing; and the broader the institutional and policy environment of data sharing in the Jamaican context.

Data Consumers Perceptions

- **Data Consumers believed that RADA's mandate** included both the provision of statistical information and technical knowledge to stakeholders within the agricultural sector.
- **RADA's technical expertise and its data collection capability were ^perceived very differently.** While RADA is seen as a trusted source for technical agricultural knowledge perceived (e.g standards, technical guides, best practices), stakeholders were less confident on the organization's ability to collect and maintain an updated resource on the activities of the agricultural sector.

Data Access

- **Agricultural data is accessed through a combination of informal and formal data channels.** However, a lack of clarity around where to get information on the agricultural sector was frustrating for data consumers. This was particularly acute among new entrants to the agricultural sector, who were less with informal channels
- **Stakeholders cited a common set of factors that used to determine the "trustworthiness" of a data resource.** However, the application of these criteria differed by data needs (e.g Stakeholder's definition of "current" data varied greatly by usage). Key factors include:
 - Currency of data
 - Frequency/Consistency of updates
 - Accessibility (Metadata, Presentation, Exportability, Analysis)
 - Coverage
 - Perceived Domain expertise

Data Management

- **As custodians of the farmer registry, protecting the privacy of data contributors is the top priority for the RADA IT team.** However, this responsibility is not shared consistently across various levels of the RADA organization with data management perceived as primarily a RADA IT mandate.
- **A false Dichotomy between "ABIS as a platform" and "ABIS as an**

information resource” exists among key stakeholders. The RADA IT team perceive their responsibility primarily as managers of the platform and the data once collected, with limited influence over the data collection process. External stakeholders, however, make no distinction between ABIS as a platform and the data they access from ABIS.

Data Privacy

- **Facilitating linkages between farmers and other agriculture stakeholders is a shared responsibility** for members of the RADA organizational hierarchy. However, tensions exist between this responsibility and the protection of farmer’s personal information.
- **Current data storage systems and practices do not facilitate the monitoring** of how and when farmer personal information or data on their agricultural activities is shared
- **No single data sharing policy exists that guides access to and distribution** of personal information from the farmer registry. The implications of this are that decision making process for facilitating or refusing external information requests differ by the channels and RADA staff individuals who receive them.

Data Collection

- **While the quality of existing data collection processes** were widely acknowledged as an issue within the RADA organization and by external stakeholders, but institutional (and individual) ownership remains unclear.
- **Existing data collection processes undermine the credibility of the ABIS platform** as a knowledge resource for stakeholders that have attempted to utilize information from the platform.
- **While ABIS has been positioned as a data resource for tracking agricultural activity** across the sector, the operational and resource constraints are not aligned with this mandate.
- **Coffee Board Partnership and Data Position Paper** provide alternative models for augmenting data collection resources
- **Willingness among service providers to contribute data** was common among data consumers if value was received in return (not necessarily monetary)

Design Recommendations

Building on the key insights identified as part of the research process, a core set of design recommendations were identified to guide RADA’s project goals. These design recommendations are included below:

Data Access & Consumption

- **Align creation of Harvest Platform with Technical Guides initiative** to create a central resource for accessing the data and domain expertise of the RADA

organization. This resource would facilitate:

- Understanding the types of information that RADA collects and the domain expertise the organization holds
- Accessing the statistical data and domain expertise (technical guides) collected and created in a more user friendly way
- Requests for additional guides or types of information desired by data consumers
- Guidance around how to access it and use information, as needed

Data Consumers

- **Incorporate metadata into various channels** through which data consumers interact with ABIS information to better inform the data should be used and interpreted
- **Develop Clip as a demonstration app for HarvestAPI**, incorporating revised guidelines around data privacy and data collection partnership
- **Facilitate exportation of data to other formats**, as appropriate to facilitate user analysis.

Data Management & ABIS

- **Revisit institutional role and ownership of the ABIS platform.** The key objectives of this should include:
 - Create shared understanding of the ABIS initiative as both a platform and data collection effort among RADA's organizational leadership
 - To extend responsibility of the ABIS initiative beyond RADA IT Team.

Data Privacy

- **Create a RADA Data Sharing Policy that guides usage and dissemination** of personal information across various levels of the organization. This policy should align with organizational realities on-the-ground to facilitate market linkages.
- **Strengthen/Develop methods for monitoring access** to the farmer registry by various users
- **Explore consent mechanisms that empower farmers to participate** in updating their information and influencing how their information is utilized by third-party service providers

Data Collection

- **Revise current strategy for collecting data** to better align with Field services resources and human capabilities
- **Develop supporting quality assurance mechanisms** for monitoring the quality of data collected and key performance indicators for data collection
- **Explore potential data collection partnerships with trusted stakeholders** to distribute the burden of data collection using HarvestAPI as a mechanism to

manage contributions.

- **Data Consumers who were also agricultural service providers expressed a willingness to contribute data** if value was received in return (not necessarily monetary)

Harvest API

At the core of this ADS strategic open data initiative is the HarvestAPI platform. HarvestAPI is an open source platform that facilitates the sharing of agricultural data across government agencies and with the public. The platform is being developed in collaboration with RADA to increase access to the Agricultural Business Information System (ABIS), which stores the Government of Jamaica Farmer register.

In 2012, a HarvestAPI prototype was developed as part of the Code For The Caribbean Innovation Fellowship programme, which RADA participated in. The prototype was used to illustrate how increased data collaboration through the opening up of data could catalyze innovation in the sector, and in the process, overcome some of the structural challenges that limit the access, usage and maintenance of quality agricultural data.

For the ADS strategic initiative the HarvestAPI was redeveloped as a scalable platform to meet RADA's demands for the institutionalization of the platform and also to incorporate emergent best practice approaches to designing government digital services and responsible data privacy practices. The primary goal of the collaboration is for HarvestAPI to become the primary platform through which RADA facilitates access to its farmer register of 200,000 members.

Data & Privacy Approach

The current version of HarvestAPI, developed in collaboration with RADA, will be hosted by the government agency and used as the primary platform to enabling access to the farmer registry of more than 200,000 registered farmers. The platform will facilitate access to information on farmers (profiles, registration etc.), farms and agricultural production (crops and livestock) in accordance with a new privacy RADA is developing in collaboration with SlashRoots.

Adopting the UK Government Digital Service's definition for classifications of registers⁵, the SlashRoots and RADA project teams developed different levels of access levels to inform and how users could have access to data. Initially data classifications were decided at the resource field level, but plans are underway to investigate alternative that could allow farmers more control over how their information is shared. The current proposal for the classification of data includes:

⁵ <https://gds.blog.gov.uk/2015/10/13/the-characteristics-of-a-register/>

1. **Open** - Information that is accessible by default(public). The data may be accessed, copied and derived freely, by anyone, either as specific entries or the entire register, with clear licensing terms designed for reuse
2. **Shared** - Information related to specific entries within the registry that can be accessible with permission, as defined by RADA's access controls policies
3. **Private** - Sensitive information which cannot be accessed directly by services. This data may be accessibly via simple questions, subject to access controls defined by RADA (e.g Is an individual registered as an active farmer?)
4. **Closed** - Information that is private to the RADA organization and and not available to any connected digital service. (e.g Citizen Tax Registration Number)

HarvestAPI Architecture

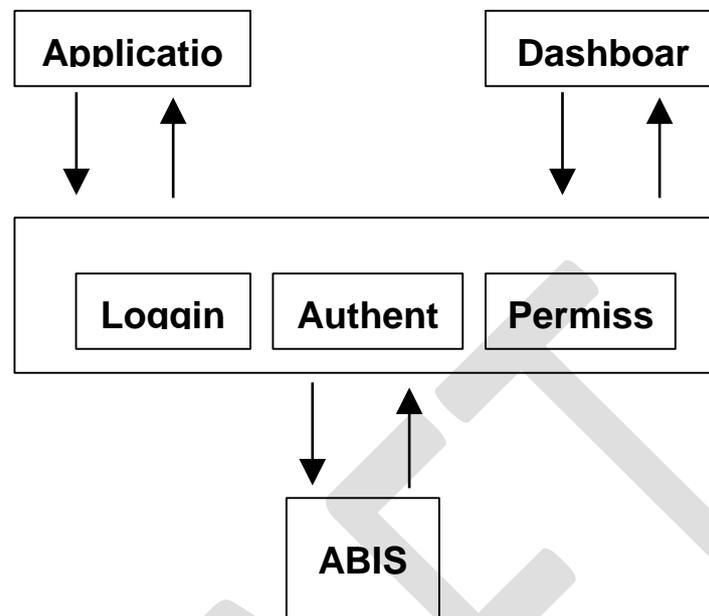
At the conclusion of the ADS problem discovery project phase, the SlashRoots and RADA project teams held a Synthesis workshop to review the findings and design recommendations. The primary outcome of this workshop was a product backlog for the HarvestAPI minimum viable product.

Based on key user interviews and other research insights a prioritised list of of the functional and nonfunctional requirements were defined as user stories. The below table provides a description of the HarvestAPI MVP user stories.⁶

⁶ The entire HarvestAPI Product Backlog can be viewed at <https://docs.google.com/a/slashroots.org/spreadsheets/d/11MWOaawlaBsBXCSOcmhOAFSslaP9OJer2dDtCZ-Edb8/edit?usp=sharing>. A Complete list of HarvestAPI user stories defined in the synthesis session is documented at the Annex.

Feature	Priority	As a(n)	I want to	So that..
User Management	Must Have	Admin	view all users	I know who has access to the system
	Must Have	Admin	view all app activity	I know how the data that is being consumed through HarvestAPI is being used
	Should have	Admin	view all user roles	I know which user roles are available in the system
	Should Have	Developer	view my user information/profile	see what information the system has on me
	Nice to Have	Admin	view my user information/profile	see what information the system has on me
User Registration	Must Have	Developer	sign up to the Harvest App	I can get a
	Must Have	Developer	sign in to the HarvestApp	I can access the Harvest apis that are available
Developer Dashboard	Should Have	Admin	disable an application	I can prevent it from accessing information from the Harvest platform
	Should Have	Developer	enable an application	I can manage my API keys
	Must Have	Developer	create an application	it can create an api key that can consume the data
Documentation			see information about Harvest and the various resources and endpoints that the HarvestAPI offers	
	Must Have	Developer		I know what is available to me
Audit Logs	Must Have	Admin	I want to see an audit log of user access	I know who accessed the system and when

The architecture of HarvestAPI is outlined below:



The HarvestAPI platform Minimum Viable Product (MVP)⁷ was designed primarily for two core types of users - developers as a subset of the Data Consumers BP and register (ABIS) administrators, a subset of the RADA BP. The major features for the developers was the ability to create an API key per application that could consume the data that is now readily available and open. The documentation outlines the tables and fields that are available, and the possible functions that they could use to retrieve the data. See images below of screenshots of the Developer Dashboard and the Documentation page.

⁷Minimum Viable Product (MVP) is the version of a new product that encapsulates a subset of all the features of the product that are of the highest value and will bring the greatest value to the intended users.

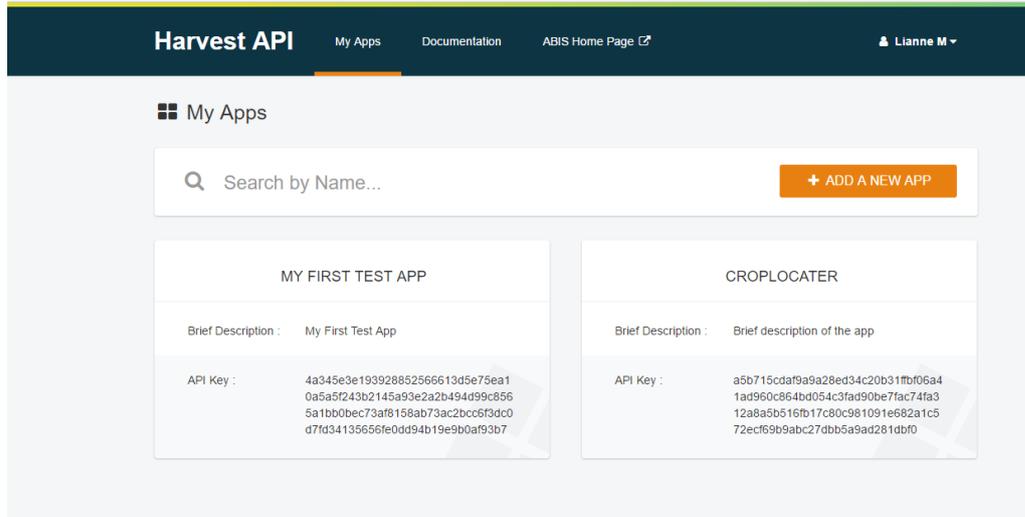


Image of the Developer Dashboard

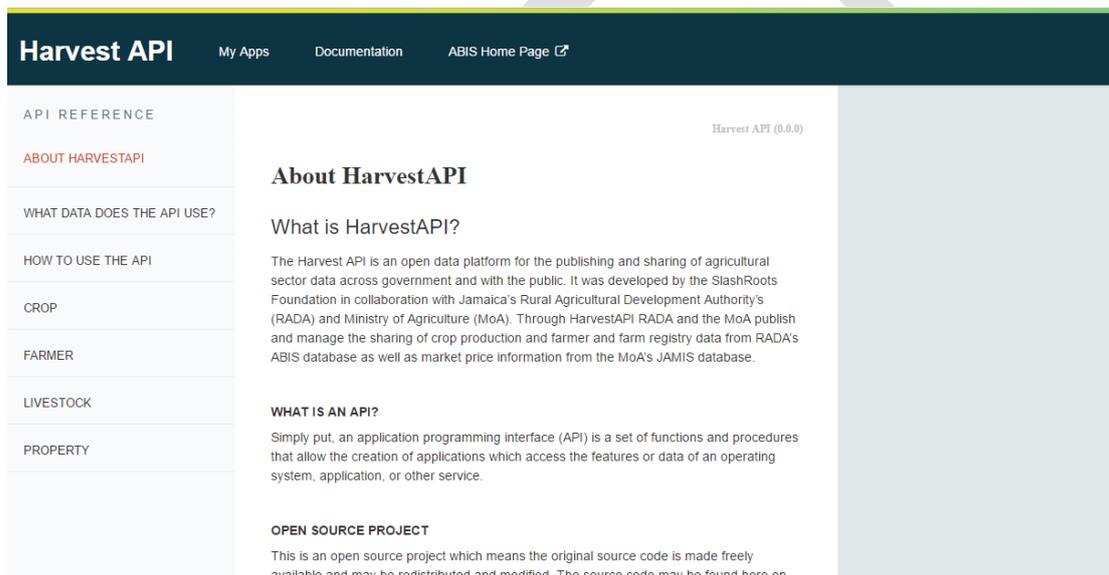


Image of the HarvestAPI Documentation

For the administrator, a dashboard was created to provide a quick summary of the activity happening within Harvest. Information that is logged and accessible through the dashboard including any user and app activity such as when a user signs up, whenever one signs in, when an app is created and the resource that an app requests at any time. Providing this information allows for the RADA IT team to easily see what the HarvestAPI is being used and how frequently.

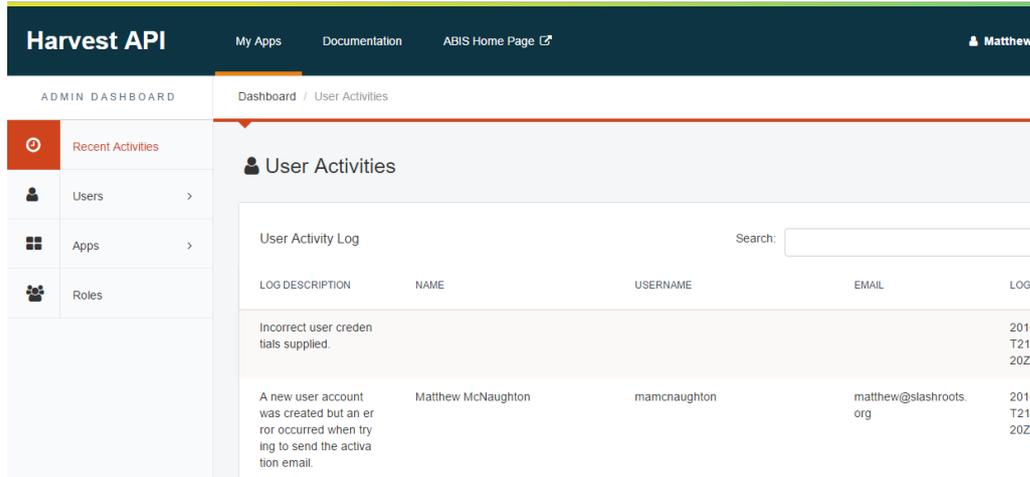


Image of the Admin Dashboard

Other Project Outputs

- HarvestAPI Platform Documentation
- Research Paper
- Clip Demonstration Application GODAN Open Data Conference Presentation
- Blogs

6 Overall Conclusions and Recommendations

6.1 Mission Outcome & Progress towards Vision

During a data needs mapping exercise in the Project Inception workshop, the RADA and SlashRoots project teams reflected on “What digital infrastructure is required to meet the data needs that RADA is responsible for fulfilling?” At its core the Agriculture Digital Service strategic initiative has sought to answer this question, while also considering the future privacy and policy implications of an increasingly digital and accessible data architecture.

With the development of the HarvestAPI, the ADS project has contributed significantly towards this vision. In the first week of December, a HarvestAPI pilot is scheduled to take place with external service providers and internal government teams. In this pilot, the participating data consumers will be extending their existing services or creating new products to test and provide feedback on the Harvest platform. This will be the first time stakeholders outside the RADA organization will be able to have a full overview of the data that RADA collects and a clear process through which they can access this information. A public launch is also scheduled for the first quarter of 2017.

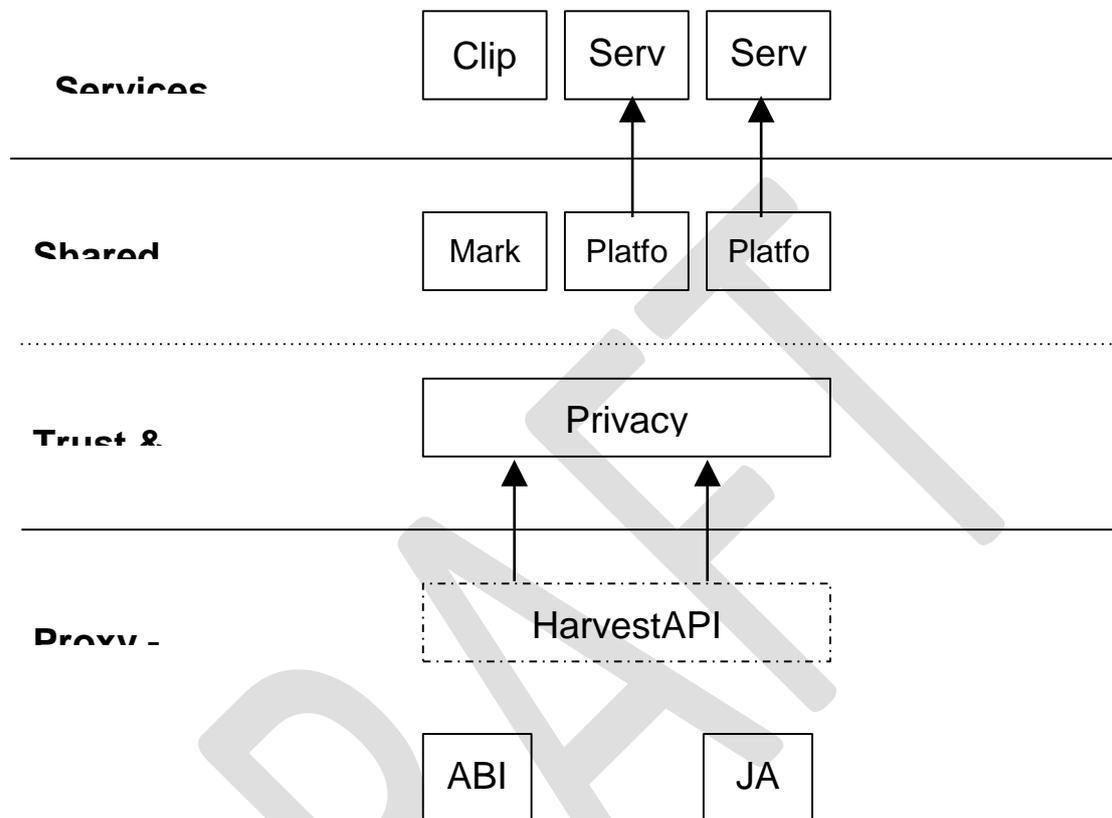
Of similar importance has been the organizational change that has occurred over the course of project implementation.

Throughout the ADS project, the SlashRoots and RADA project teams worked closely together and with potential users of the HarvestAPI platform. Not only have we seen increased collaboration and trust between the teams, but, as the platform prototypes became increasingly functional, also a broadening of RADA’s perspective on the role the HarvestAPI platform could play in the sector. As a result, the team has deepened areas of collaboration with the SlashRoots project team and also accelerated its own internal timelines for investments in the organization’s underlying data infrastructure to support the broadening vision. Examples of these changes include:

- **Accelerated timelines for the creation and publication of a Agriculture Sector Data Dictionary** and a complementary review and upgrade of existing database systems
- **Willingness to connect the HarvestAPI platform to the live ABIS database**, rather than a copy. This will be critical in ensuring that the data exposed through ABIS will always remain updated with RADA’s ongoing data collection efforts.
- **Creation of a RADA data privacy policy** to guide how members of the organization manage and share farmer’s personal information.

The implementation of these initiatives along with the launch of HarvestAPI will be

catalysts in the progress towards creating a more data-driven agriculture sector. The below diagram depicts an updated illustration of the digital infrastructure defined in the Towards a Data Driven Agricultural Sector Concept note which proposed the underlying Theory of Change for this ADS strategic initiative.



Despite the progress made through the ADS Pilot, two key project mission objectives were not fully implemented, at the time of writing this report, as initially planned. These include

1. The design of consent models that facilitate active participation of farming communities in decisions about how data about them is being used.
2. The implementation of a revised data collection model to address the data collection gaps produced as a result of structural challenges of the agricultural sector
3. Influencing the ongoing policy discussion on open data and data privacy within the Government of Jamaica through lessons learned and pilot demonstrations

However, discussions are underway to prove viable entry points for addressing both outstanding project goals.

As it relates to the farmer consent mechanism, RADA has requested support from the SlashRoots team in developing a privacy policy for the organization. This privacy policy, initially will guide how data is shared via the HarvestAPI platform. Additional design

research focused on understanding farmers' understanding of their data rights, their interest and capability related to being involved with how their information is used and potential mechanisms through which to operationalize a consent mechanism.

SlashRoots is also holding parallel project discussions with the Jamaica Agricultural Society to launch a marketing platform to support market linkages and access between farmers and buyers in Jamaica. The proposed platform will be integrated with HarvestAPI and provide data updates through the transactions that the platform facilitates. Many of the data consumers engaged during the research process also indicated an interest in contributing data back to RADA through the HarvestAPI platform. While the initial MVP of the HarvestAPI platform focused on the data supply-side, these initiatives provide entry-points for the next phase, which can enable the implementation of a data commons concept.

6.2 Theory of Change

The below section provides an overview of emergent insights and lessons learned identified from the implementation of the ADS strategic initiative.

Tensions can exist between privacy and end-user interests

In the case of RADA generally, and extension officers specifically, one of their core responsibilities is connecting the farmer with market opportunities. Access to markets is one of the top support requests that farmers requests. However, in many cases this involves giving interested parties personal information of farmers, often in response to information and sporadic requests from buyers.

Extension officers, the Ministry Of Agriculture's primary interface with the farming community, are often most aware of status of farmers and their activities. However, the informality of the sector has enabled a common practice of information sharing which does not lend itself to informed consent as a prerequisite for information exchanges.

This has raises an important tensions between privacy, benefit and the agency of the individual. As RADA develops its first privacy policy to inform how information is shared, it will be important not impede the important and necessary role intermediaries like extension officers play in serving the farmer interest.

Furthermore, as the team research potential consent models to empower and inform farmers about how their information is used, these mechanisms will have be sensitive to the capabilities that exist within the farming population. It is likely that the transaction-based consent models, more common in the OECD Countries, would overwhelm the average Jamaican farmer. This led to exploring models that included potential

intermediaries that could protect the farmer's interest and can monitor, on their behalf, how their information is being used.

Misalignment between operational realities of data collection and user expectations around usage can derail Open Data Initiatives

The research process enabled the RADA team to gain a better understanding of the factors that influenced data consumers most in deciding to use a data resource, their perceptions of RADA's data resources, and their experiences trying to access those resources in the past. These were all key considerations in determining how the Harvest platform was developed.

However, RADA has traditionally positioned the ABIS platform as a comprehensive information resource on the agriculture sector, but has not had the sufficient resources to fulfill this commitment. This has led to frustration of data consumers and increased mistrust of the structures and systems that RADA holds.

As RADA expands access to ABIS through the adoption of the HarvestAPI platform, it will also need to revisit its data collection processes, and the role ABIS plays in the organization, or risk existing stakeholder frustrations inhibit the willingness to utilize the HarvestAPI platform. This decision, however, it beyond the mandate of the RADA IT team that has thus far led the engagement in the development of the HarvestAPI.

6.3 Conclusions & Future Research

Conclusions and suggestions for future Caribbean Open Data research that can further validate, replicate/scale or generate further insights.

Agriculture is a data-reliant sector that is inhibited by information asymmetries and data gaps that are the result of the difficult environments that it often operates in many developing country contexts. This ADS Strategic Initiative has sought to research, develop and implement infrastructure that help to overcome these challenges. The development of HarvestAPI, a key output of this project, and its adoption by the Rural Agriculture Development Authority, the custodians of the Government of Jamaica Farmer Registry, has the potential significantly increase the access and usage of agricultural data.

While the research and artifacts created through this project are important contributions, the project has also raised important questions that require follow on exploration. In particular these include:

- **Consent Mechanisms to facilitate Responsible data sharing** - The project

unearthed important tensions that exist between privacy, the benefits of information sharing, and the agency of the individual to influence how their information is used. This is an aspect of the data privacy discourse that is not commonly discussed but is particularly acute in the agricultural context. The research team would recommend further research in developing alternative consent models for developing country contexts where citizens may have low or limited digital literacy and unable to participate in transaction-based data privacy models that are becoming increasingly common on the Internet and in OECD countries.

- **Alternative approaches to scaling data collection efforts in resource-constrained developing country contexts** - With 200,000 registered farmers and less than 200 extension staff, traditional approaches to collecting information, such as surveys and interpersonal interactions, will not sustainably scale to accurately cover the sector. These challenges are not unique to RADA's circumstance

The proposed open architecture approach, on which the ADS strategic initiative was implemented, presents a compelling alternative for scaling data collection, while also spreading its resource requirements, across multiple actors in the sector. With the upcoming launch of HarvestAPI by RADA and parallel discussions with key service provider, we believe there is a unique opportunity to implement this model and investigate its potential value-contribution.

7 ANNEXES

DRAFT