2016 NASCIO Award Submission

STATE OF CALIFORNIA

Title: *Milk and Dairy Food Safety Sample Barcode Submission Mobile Application*

Category: *Emerging & Innovative Technologies*

Contact: California Department of Food and Agriculture

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Executive Summary:

Billions of dollars in animal agriculture, the lives of millions of animals, the integrity of the food supply, and public safety are all at risk in the event of a disease outbreak. In keeping with the California Department of Food and Agriculture's (CDFA) strategic goals, the Milk and Dairy Food Safety (MDFS) branch has prioritized emergency response readiness, and the Sample Barcode Submission mobile application helps meet those goals.

CDFA's MDFS branch ensures that California's milk, milk products, and dairy food products are safe, wholesome, and properly labeled through licensing, inspection, sampling, and enforcement activities on dairy farms, during milk transportation, and at milk and dairy food processing plants. Dairy Food Specialists and Environmental Scientists (inspectors) gather approximately 116,000 samples annually from 750 dairy farms, 470 processing plants, 400 pasteurizer units, 1,000 bulk milk tanker trucks, and 5,000 soft-serve ice cream facilities, and evaluate 2,600 bulk milk tanker drivers in accordance with state law and federal Pasteurized Milk Ordinance requirements for interstate commerce.

The Sample Barcode Submission mobile application allows staff to collect data electronically in the field and transmit that data to a variety of destinations in real-time. The application leverages custom-built mobile platform software, native mobile device system features, web services, and database technology to address a number of opportunities for increased efficiency, improved services and enhanced emergency response readiness.

Business Problem and Solutions:

Since inspection and sampling efforts are central to the milk and dairy food supply protection efforts, program staff examined existing inspection procedures and targeted cumbersome and error-prone paper processes for improvement. Historically, MDFS inspectors have spent up to four hours of each day performing redundant data entry and fulfilling reporting requirements. In addition, completing paper forms and transcribing that data into electronic form carried an approximate 10% error rate.

The Sample Barcode Submission application utilizes the most sophisticated methods available to enable electronic capture of inspection data in the field, provide secure, real-time data transmission to a variety of sources, integrate with Animal Health and Food Safety Services' Emerging Threats suite of data management applications, and interface with the California Animal Health and Food Safety (CAHFS) Laboratory to deliver sample data directly to the CAHFS Lab sample tracking database.

In addition, the mobile application standardizes inspection data by offering predetermined values for selected fields and reduces the time and effort required to complete inspections by using mobile device system features to provide date, time, geographic coordinates and other environmental data automatically without the need for inspector time and effort to determine these values.

Concept:

Program staff for the Milk and Dairy Food Safety Branch, Animal Health and Food Safety Services Division of the California Department of Food and Agriculture, pursuant to fulfilling the strategic goals of the department, recognized a host of opportunities to increase efficiency, maximize program resources, and increase emergency preparedness in their operations.

Through a collaborative effort with CDFA's in-house development team, they decided to pursue analysis, planning, and development of a software solution that would allow them to increase data reliability, eliminate redundant data entry, cut costs for both the program and program partners such as the CAHFS Lab, and greatly enhance service to both industry stakeholders and the general public. Together, developers and program staff were able to address a variety of process challenges and deficiencies through the targeted application of custom software to streamline MDFS inspection operations.

The process change and development efforts sought to meet four conceptual objectives:

The first objective, to facilitate electronic data collection during inspection activities, was addressed by translating the paper inspection form into an electronic form that is provided through the mobile application. Various controls and form elements are employed to facilitate collecting the required data, in addition to providing automatic population of environmental variables such as date, time, and geocode.

Figure 1: Inspection Data Form.

The second objective, error reduction in inspection data, was addressed through search and pre-population of various fields and by providing dropdown lists to standardize data options where appropriate. In addition to these functional features, this goal was also achieved through eliminating transcription errors when copying data from the existing paper form to a spreadsheet.
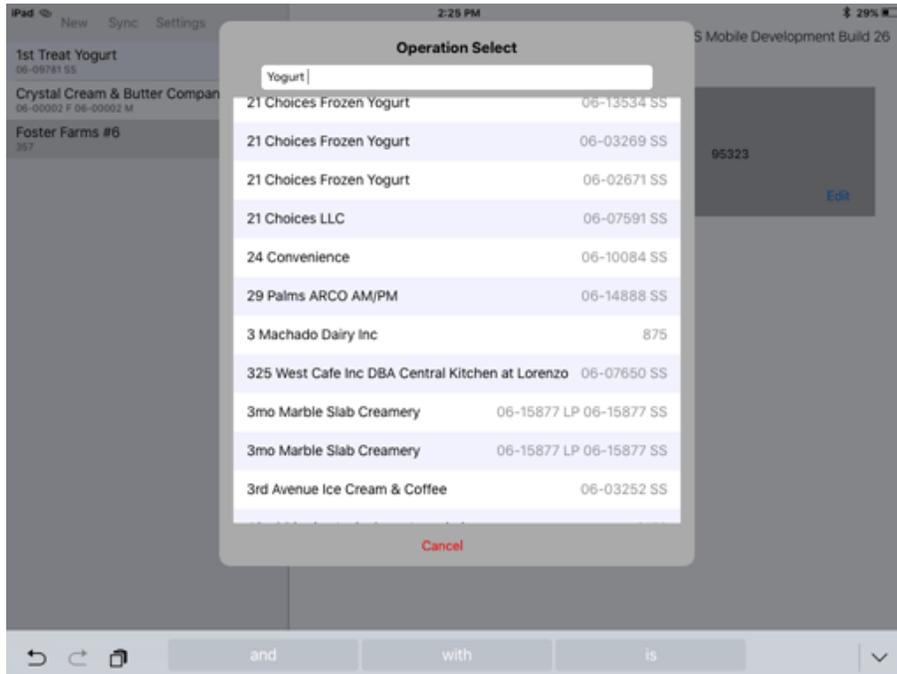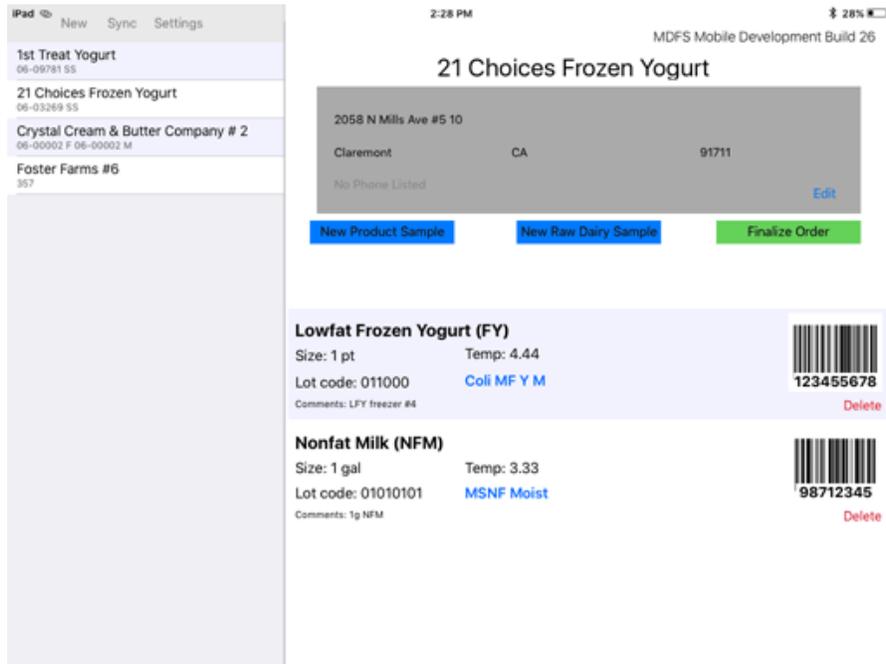

Figure 2: Existing Operations Search.

Figure 3: Pre-populated Operations data.

The third objective, increased access and control of inspection data, was addressed through the use of complimentary web services which could receive data transmitted from mobile devices in the field and then insert that data directly into a purpose-built program database. This real-time data transport not only eliminates the lag time present in mailing physical forms, but also allows the data to be automatically integrated with AHFSS' Emerging Threats suite of data management applications. This capability gives program staff the ability to analyze the most current data quickly and easily, in addition to producing reports in a variety of formats for industry, federal, and executive recipients.

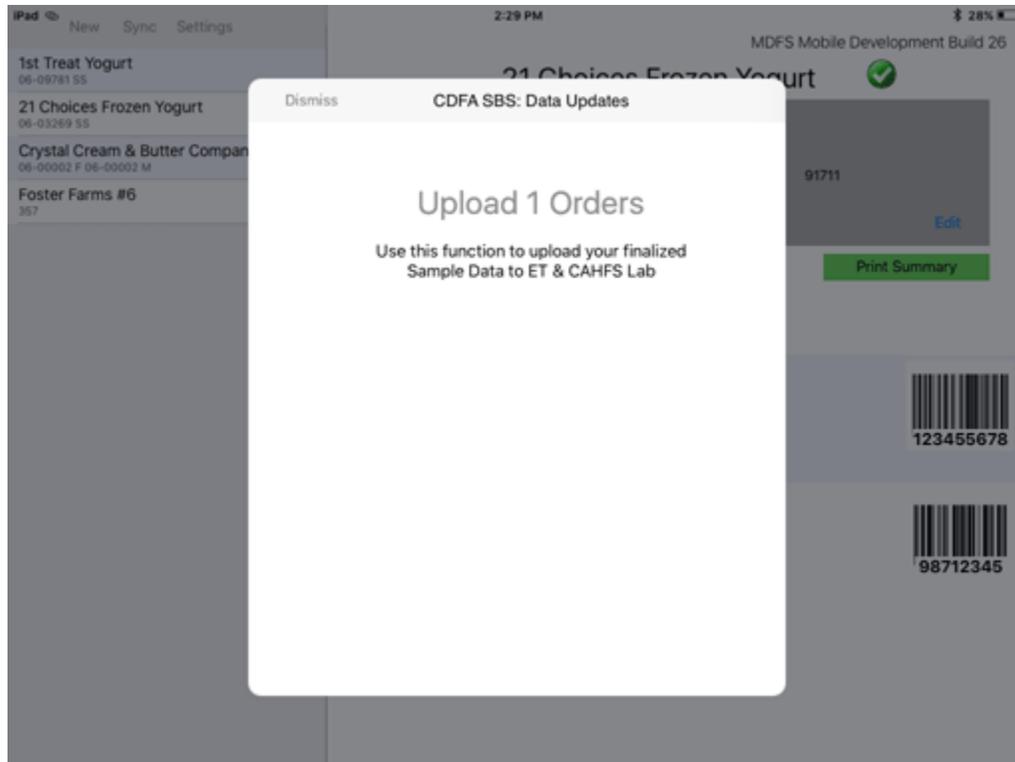

Figure 4: Data Sync capability to ET Data Management and CAHFS Lab web services.

The fourth objective, direct communications and sample data transport to the CAHFS Lab, was addressed by leveraging CDFA's web service infrastructure and working directly with technical staff at the Lab to create a pipeline to which we could submit data for integration directly into their sample tracking system.

Significance:

The combined efforts of these teams within CDFA have been at the forefront of a department-wide movement to enable electronic data collection during all kinds of field operations. The challenges faced and overcome during this effort have informed process and application design and development for subsequent applications which adhere to the same basic principles:

First, electronic data collection at a field site eliminates a substantial amount of redundant data entry. MDFS inspectors were filling out paper inspection forms to complete their duties, and then were forced to enter that same data into numerous spreadsheets to fulfill reporting requirements with program staff, industry stakeholders, and federal agencies. By taking advantage of mobile device technology, the team at CDFA was able to leverage custom-built software to eliminate the need to enter data more than once.

Second, due to conditions inherent to inspection sites, paper documents can become damaged or otherwise illegible. This led to an unacceptably high rate of error in completing inspection forms. The MDFS Sample Barcode Submission mobile application is designed to reduce the existing error rate and save inspector time by providing pre-filled form fields where appropriate, leveraging mobile device system features to gather environmental data electronically, and eliminating the cumbersome logistics of multiple paper forms and notepads.

Third, since data collection and delivery can be completed same-day as opposed to waiting days or weeks for mail to arrive, program staff has a level of control over their data that was previously impossible. This increased control and access manifests a variety of beneficial results, including sending appropriate sample data directly to the CAHFS Lab, automatic formatting of various reports for different audiences without the need for additional data entry, and most importantly, quicker responses to food safety issues that become apparent only through concerted analysis of inspection data.

Impact:

The overall impact of the Sample Barcode Submission mobile application is nothing short of transformative for MDFS operational capabilities. Time and resource savings, and error reduction are quantifiable and allow us to measure the impact of the new application and process.

Currently, as devices are put into production and the usage of the mobile application continues to ramp up, MDFS projects a savings of approximately four hours every day in redundant data entry and reporting requirements for *each inspector.* This effectively doubles MDFS' inspection volume capabilities immediately without the need for additional staff, and these benefits are ongoing for the life of the project. The effects of this magnitude of savings are crucial to the branch's emergency response preparedness level.

In addition to effectively doubling the amount of time available to perform inspections and collect samples, the CAHFS Lab will save approximately two personnel years of resources that were previously dedicated to redundant data entry. By leveraging web services and working directly with CAHFS Lab technical staff to create the services necessary to submit sample data directly to their tracking system, they will immediately free up the resources that were previously dedicated to transferring sample data from paper inspection forms into a database. These resource savings are also ongoing for the life of the project.

MDFS has reported their paper processes as having up to a 10% error rate. With the benefits of data validation, pre-set values for appropriate fields, and eliminating the need to transcribe data from paper to spreadsheets, we estimate that the application can cut the error rate to less than 1%. The error rates will drop sharply immediately upon adoption of the application in the production environment, and will continue to approach the targeted 1% as inspectors become more experienced with the application and adjusted processes.

The ability to produce ad-hoc reports and data analysis also provides time and resource savings. Program staff were spending multiple hours per week formatting raw data into multiple formats and reports for delivery to industry, federal, executive and public contacts. Standardized reporting tools with templates formatted specifically for each recipient eliminate the need for staff to manipulate or format data.