A Smartphone App to Record Food Purchases and Acquisitions

Marcelo Simas, PhD

Presented at FedCASIC 2019

April 17, 2019

Background

- › FoodAPS-2 data collection – USDA / ERS
  - Challenge is to lessen burden to reduce underreporting
  - Other consumer purchasing surveys face similar challenges
- › Initial Hybrid App - ADCM
  - Data collection test used a web-based app
  - Collected food acquisitions for all members of a household over a seven-day period
  - Smartphone host app created to better integrate for bar code scanning – require steady internet to function

› Food Events

- Where do they happen and what are they?
  - Food at home (FAH) – food you bring home
  - Food away from home (FAFH) – food you acquire and consume out of home
- How much did you pay?
- How did you pay?

› Food Items

- Type of item, quantity/amount, price

Current Implementation Status

› Single adult/primary respondent

- Captures FAH & FAFH acquisitions
- Excludes meals at school
- Excludes shared meals

› Future versions

- Include all household members
  — Allow for data sharing among household members
  — Capture school meals
  — Reduce burden by entering shared meals only once
- Integrate with web instrument for non smartphone participants
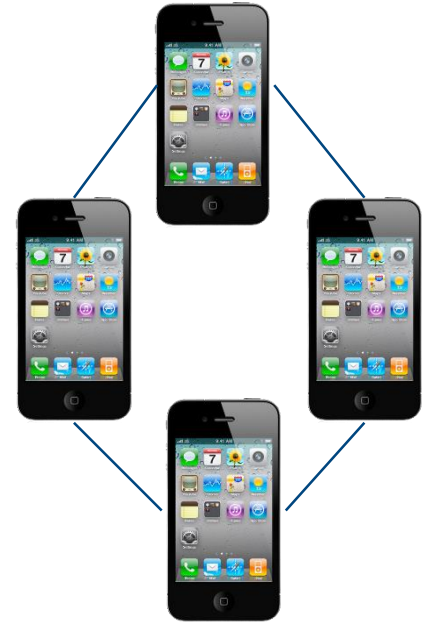
App Implementation Strategy

> Leveraged work done for DailyTravel HTS app

- Cross-platform

- Battery efficient location capture

- Fully disconnected mobile survey engine

- Used by thousands of participants across US and Canada

> Created new pages to bridge transitions between survey levels

- Stop, Food Events, Food Items

> Survey pages using programmable instruments

- Added new question types (bar code scanning, PLU, picture taking, etc.)

> Integrated with additional cloud services

App Technical Details

> Implemented in C# using Xamarin Forms

  - Approximately 90% of source code shared between iOS and Android (.NET Standard)

  - Encrypted SQLite database on phones

> Server components implemented in C#

  - Website and services API in .NET Core

  - Phone activation

  - Secure data uploads and downloads

> Server database hosted by PostgreSQL

  - Survey responses stored in binary JSON

New FoodAPS-2 Apps

› Native apps for iOS and Android (started in October of 2018)

- Ability to run in disconnected mode
- Faster, more responsive user interface

› Apps to be installed on participants' phones (BYOD)

- Web versions to be made available as fallback

› Reduce respondent burden through technology

- Location tracking, picture taking, receipt reading
- Integrate with online services (Nutritionix, Calorie Mama)

› Improve accuracy of food events and items

- Link items to locations

General App Flow

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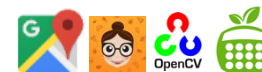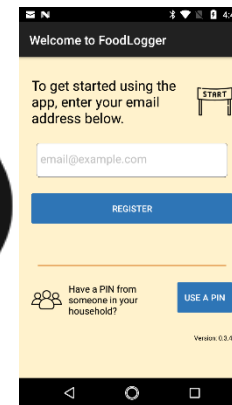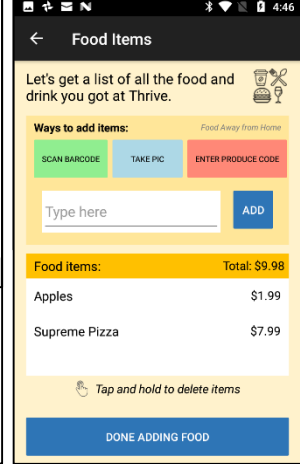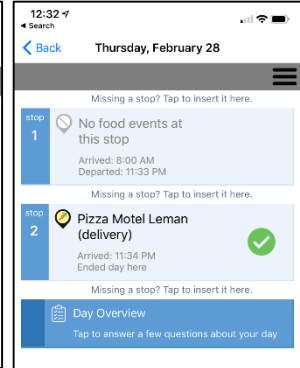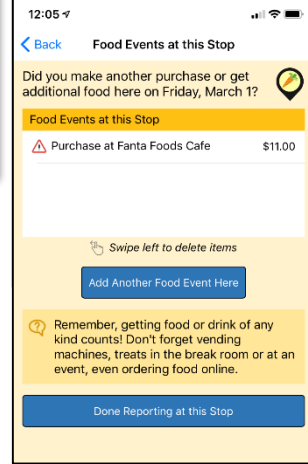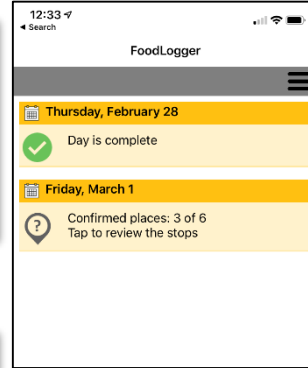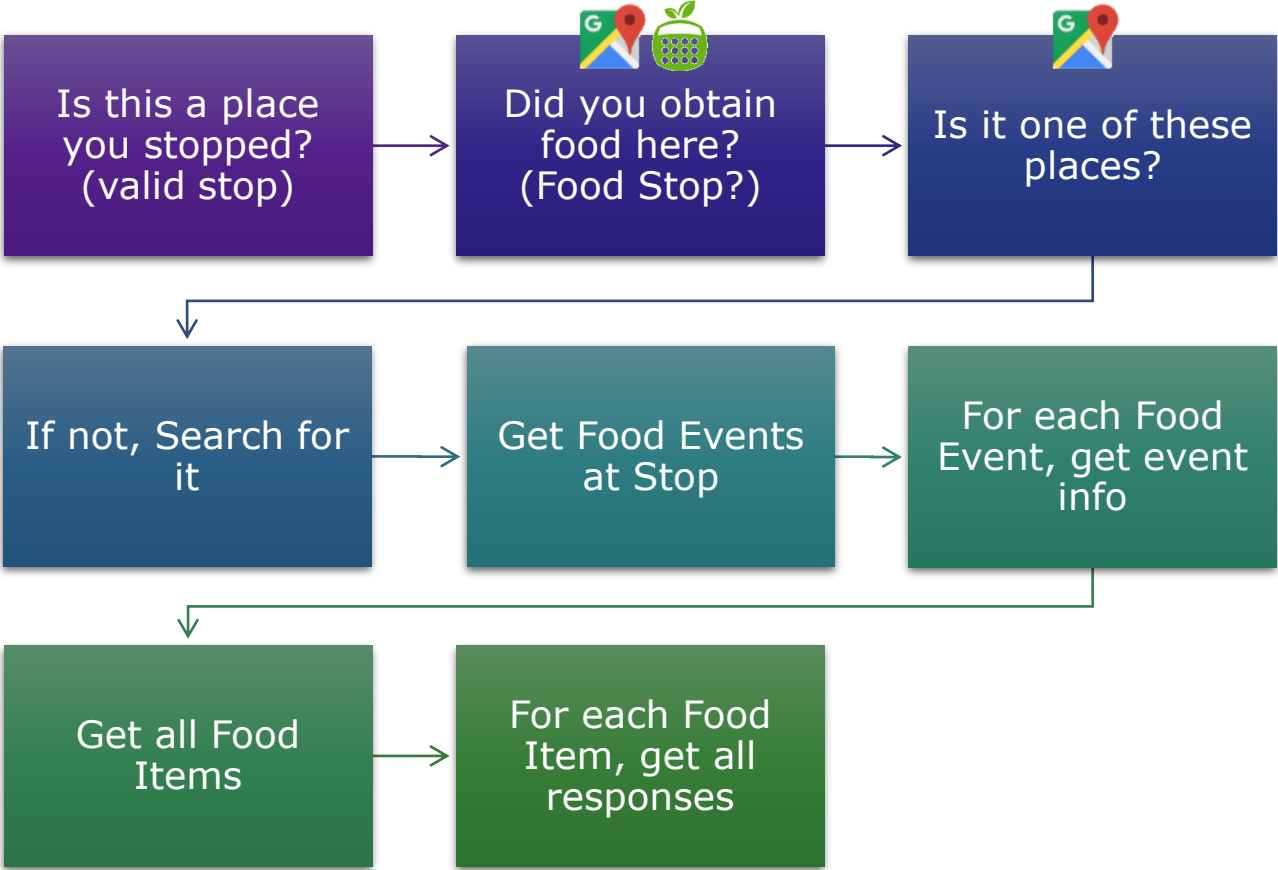
> List of food locations near stop

- Google Places and Nutritionix APIs

> Auto-complete suggestions based on location's items

- Restaurant menu items or grocery store

> Matches scanned barcodes codes to product descriptions and other data

> Uses Calorie Mamma machine vision for FAFH when a "picture" is taken

- Identifies potential matches and asks respondent for confirmation
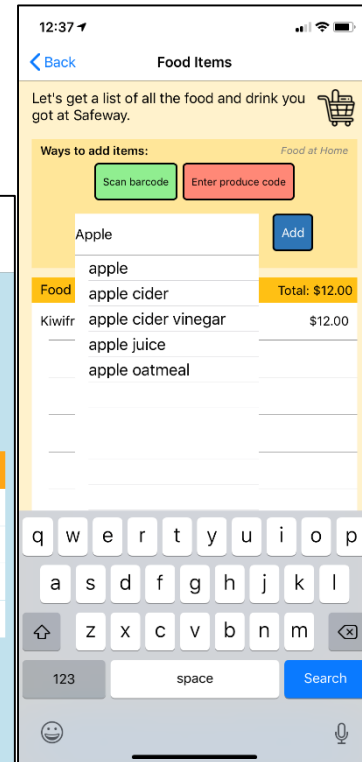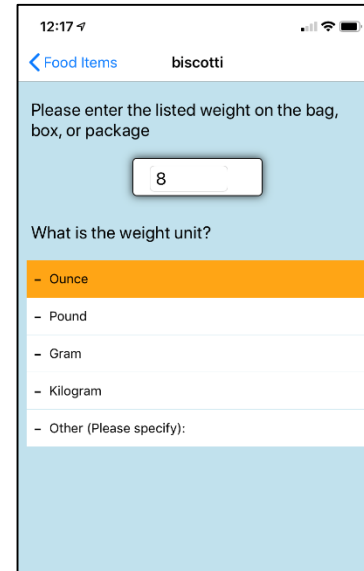
Internal Testing and Review

› Conducted internal feasibility test with no training earlier in 2019

› Main feedback items were

- Stop detection sensitivity needs to be adjusted
  (too many short stops detected)

- Maps should be made bigger

- Not all participants noticed that they could add items using…

  — Barcode scanner

  — PLU code

- Keyboard was hard to dismiss on some survey pages

Work in Progress - Processing of Receipts

> Receipt pictures uploaded to Westat

> Python code hosted inside R package running on OpenCPU

> Server runs through a series of steps

- Filter out background using OpenCV

- Stitch images back together

- Perform OCR

- Search for totals and items

> App checks for completion and downloads data

- User is presented details
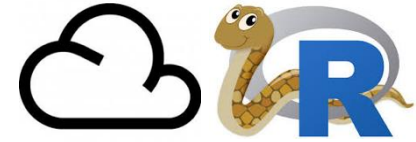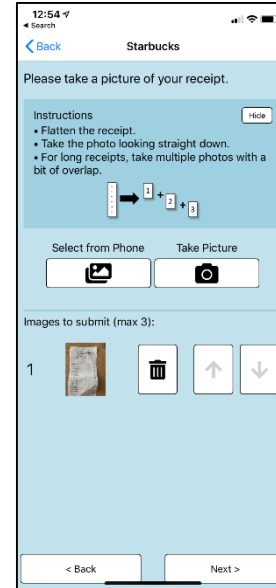
Next Steps

› Working with ERS to revise and simplify instruments at all levels (stop, food event and food items)

› Will create web alternative for participants that would rather not use a smartphone

- Participants will be able to start on smartphone and finish on web

- Single integrated server database

› Field test to take place in 2020/2021

Thank You

For more information on Westat branding, contact MarceloSimas@westat.com