Georgia Department of Agriculture

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ARMIS – Automated Recall Monitoring Information System
Standard Enhancement Projects (SEPs)
Georgia Department of Agriculture
Food Safety Division

1) Rationale and Justification for ARMIS as an SEP
   - a) FSMA mandates a national Integrated Food Safety System (IFSS)
   - b) Updated MFRPS includes surveillance of FOOD-RELATED INCIDENTS (FRI) (5.3.2.2)
   - c) Required documentation is log/database that tracks notification of FRI (5.5.5)
   - d) Only validated data on FRIs are USDA and FDA press releases
2) Information on Python
   - a) Supports Object-Oriented Programming and functional programming
   - b) Packages: directories for modules containing functions, classes, variables, etc. built for specified purpose
   - c) Clear, concise syntax
   - d) Often used in web/internet development (Django) & scientific applications (SciPy)
   - e) https://wiki.python.org/moin/BeginnersGuide/NonProgrammers
3) ARMIS Concept
   - a) Executable written in Python 2.7
   - b) Analyzes RSS feeds and source HTML scraped from press releases
   - c) Inputs data into Excel spreadsheet (.xlsx)
   - d) Uses USDA and FDA RSS feeds (Really Simple Syndication) via feedparser
   - e) Data fields are analyzed and populated using packages:
     - i) Natural Language Toolkit
     - ii) BeautifulSoup
     - iii) Openpyxl
   - f) Graphic User Interface made with Tkinter

<u>Timeline: Fiscal Year 2015-2016</u>

1) Develop software in Python for periodically reading RSS XML data to scrape HTML from associated URLs.
    - Research Python documentation for appropriate packages.
    - Write code for obtaining RSS XML data, parsing URLs from RSS entries, and scraping HTML.
    - Use HTML data to recover necessary information
    - Program input function to insert data into appropriate data fields in Excel spreadsheet

2) Develop a validated dataset for quality assurance.
    - Continue manual data entry via USDA and FDA food and feed recall press releases into Excel spreadsheet using FY2014-2015 spreadsheet format.

3) Create textual analysis components to recognize food products, product information, and other data.
    - Research text analysis packages in Python documentation, such as NLTK and BeautifulSoup
    - Find APIs that may help with text analysis and query.
    - Create functionality to deduce Company, Food Item, Adulterants, etc.

4) Develop Graphic User Interface.
    - Research GUI python packages to determine most appropriate format.
    - Use desired package to achieve usable GUI (Tkinter)
    - Debug and QA interface.
    - Research methods of cross-platform executables

5) Create validation process and codify SOP.
    - Cross check results of ARMIS run with validated dataset.
    - Use non-concordant data for QA and debugging
    - Develop Standard Operating Procedure (SOP) for ARMIS operation.

Timeline: Fiscal Year 2016-2017

1) Develop a methodology for auditing ARMIS sensitivity and fidelity.
   - Explore sampling methods
   - Cross-check with spot manual reads of FDA/USDA press releases.
   - Assess the program for inefficiency and retool, if necessary.

2) Expand the capabilities and flexibility of ARMIS
   - Use new and existing directories to predict and provide information with potential partners (Minnesota Department of Agriculture has already agreed to help test it in their system).
   - Expand types of exported data formats (e.g. CSV, .dat, SAS).
   - Evaluate the feasibility of integrating a notification system tied to recall audit/effectiveness checks, wherein the FDA 3177 audit form (or equivalent) would be automatically sent out to inspectors for them to complete upon request.
   - Create new functionality, such as analyzing data in real-time (using either Python, Excel or another statistical package), comparing other states, and custom searching.
   - Increase interoperability of system with other programs (e.g. R, SAS, SPSS, Access).

3) Investigate integration with G-Force or other notification systems.
   - Research a method to integrate ARMIS with G-Force. If not possible, determine best alternative method for information dissemination (e.g. Email, Sharepoint).
   - Research Python documentation for implementing notification system with ARMIS.
   - Develop coding to integrate ARMIS with G-Force or other notification system

4) Modify SOP, if necessary.
   - Use non-concordant data for QA and debugging
   - Edit Standard Operating Procedure (SOP).

APHA 2016 Annual Meeting Presented Abstract

Note: Some aspects of the program have changed since the submission of the abstract (Spring of 2016) and ARMIS' current configuration. The program no longer relies on openFDA API due to it being deprecated and unvalidated.

Background

The Food Safety Modernization Act mandates a national Integrated Food Safety System with the goal of facilitating a safer US food supply. For state-level surveillance, food and feed recall data are manually inputted from their respective USDA and FDA press release webpages. ARMIS is designed to reduce human error and streamline surveillance analysis.

Methods

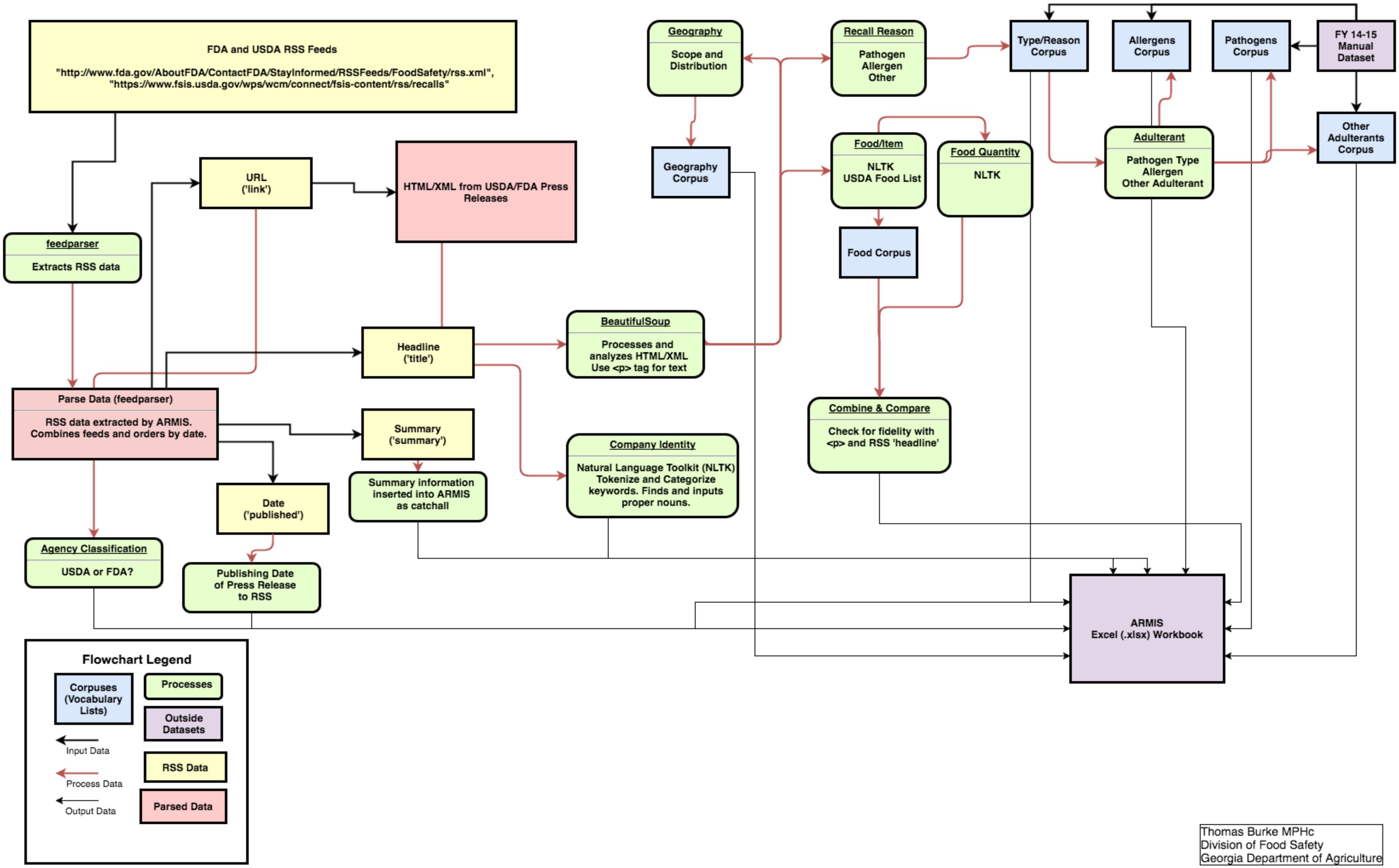
For FDA and USDA recalls, agency press releases are the sole source for validated data. Therefore, to automate data retrieval, ARMIS exploits RSS (Really Simple Syndication) feeds to scrape HTML from each recall press release. Using publicly available datasets and application programming interfaces (APIs), the collected HTML is queried for pertinence to Georgia and specific recall information, such as classification, causation, pathogen or allergen, and distribution. Constructing the program applied web-based data collection techniques from online python documentation and programming texts. Python packages feedparser, openpyxl, and lxml were required for the system's functionality.

Results

The resultant software program organizes and inputs relevant recall information into a Microsoft Excel spreadsheet. The ARMIS cross-platform graphic user interface design will allow non-programmers to implement the system. Validation methodology is in development to test concordance with current manual data entry.

Implications

We anticipate that ARMIS will be adopted, modified, and extended so all state departments of agriculture may reduce menial data entry and increase data fidelity. Additional phases are planned to extend the surveillance via webcrawling techniques and give ARMIS data mining capabilities.



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Division of Food Safety
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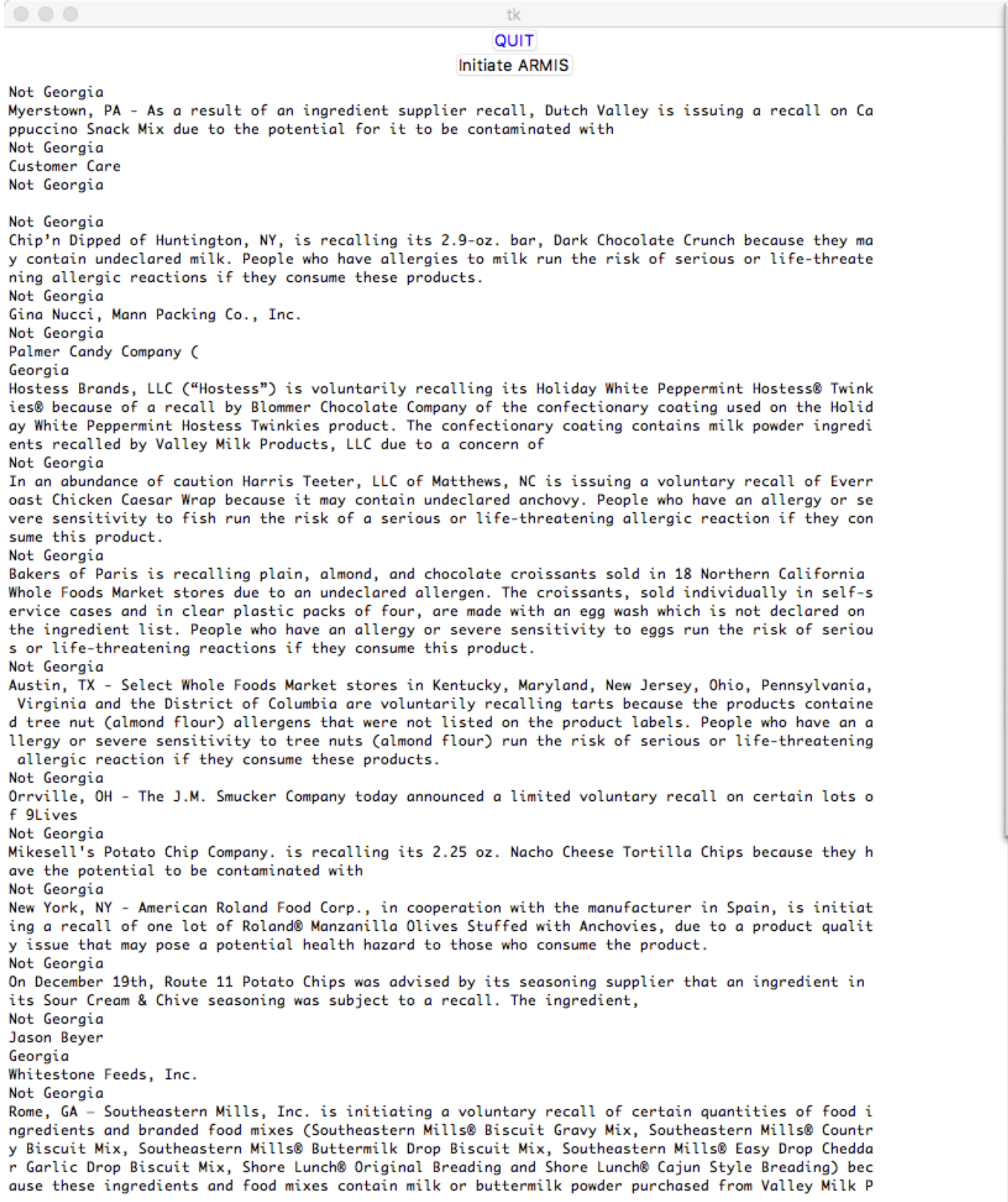

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Not Georgia
Myerstown, PA - As a result of an ingredient supplier recall, Dutch Valley is issuing a recall on Ca
ppuccino Snack Mix due to the potential for it to be contaminated with
Not Georgia
Customer Care
Not Georgia

Not Georgia
Chip'n Dipped of Huntington, NY, is recalling its 2.9-oz. bar, Dark Chocolate Crunch because they ma
y contain undeclared milk. People who have allergies to milk run the risk of serious or life-threate
ning allergic reactions if they consume these products.
Not Georgia
Gina Nucci, Mann Packing Co., Inc.
Not Georgia
Palmer Candy Company (
Georgia
Hostess Brands, LLC ("Hostess") is voluntarily recalling its Holiday White Peppermint Hostess® Twink
ies® because of a recall by Blommer Chocolate Company of the confectionary coating used on the Holid
ay White Peppermint Hostess Twinkies product. The confectionary coating contains milk powder ingredi
ents recalled by Valley Milk Products, LLC due to a concern of
Not Georgia
In an abundance of caution Harris Teeter, LLC of Matthews, NC is issuing a voluntary recall of Everr
oast Chicken Caesar Wrap because it may contain undeclared anchovy. People who have an allergy or se
vere sensitivity to fish run the risk of a serious or life-threatening allergic reaction if they con
sume this product.
Not Georgia
Bakers of Paris is recalling plain, almond, and chocolate croissants sold in 18 Northern California
Whole Foods Market stores due to an undeclared allergen. The croissants, sold individually in self-s
ervice cases and in clear plastic packs of four, are made with an egg wash which is not declared on
the ingredient list. People who have an allergy or severe sensitivity to eggs run the risk of seriou
s or life-threatening reactions if they consume this product.
Not Georgia
Austin, TX - Select Whole Foods Market stores in Kentucky, Maryland, New Jersey, Ohio, Pennsylvania,
 Virginia and the District of Columbia are voluntarily recalling tarts because the products containe
d tree nut (almond flour) allergens that were not listed on the product labels. People who have an a
llergy or severe sensitivity to tree nuts (almond flour) run the risk of serious or life-threatening
 allergic reaction if they consume these products.
Not Georgia
Orrville, OH - The J.M. Smucker Company today announced a limited voluntary recall on certain lots o
f 9Lives
Not Georgia
Mikesell's Potato Chip Company. is recalling its 2.25 oz. Nacho Cheese Tortilla Chips because they h
ave the potential to be contaminated with
Not Georgia
New York, NY - American Roland Food Corp., in cooperation with the manufacturer in Spain, is initiat
ing a recall of one lot of Roland® Manzanilla Olives Stuffed with Anchovies, due to a product qualit
y issue that may pose a potential health hazard to those who consume the product.
Not Georgia
On December 19th, Route 11 Potato Chips was advised by its seasoning supplier that an ingredient in
its Sour Cream & Chive seasoning was subject to a recall. The ingredient,
Not Georgia
Jason Beyer
Georgia
Whitestone Feeds, Inc.
Not Georgia
Rome, GA – Southeastern Mills, Inc. is initiating a voluntary recall of certain quantities of food i
ngredients and branded food mixes (Southeastern Mills® Biscuit Gravy Mix, Southeastern Mills® Countr
y Biscuit Mix, Southeastern Mills® Buttermilk Drop Biscuit Mix, Southeastern Mills® Easy Drop Chedda
r Garlic Drop Biscuit Mix, Shore Lunch® Original Breading and Shore Lunch® Cajun Style Breading) bec
ause these ingredients and food mixes contain milk or buttermilk powder purchased from Valley Milk P
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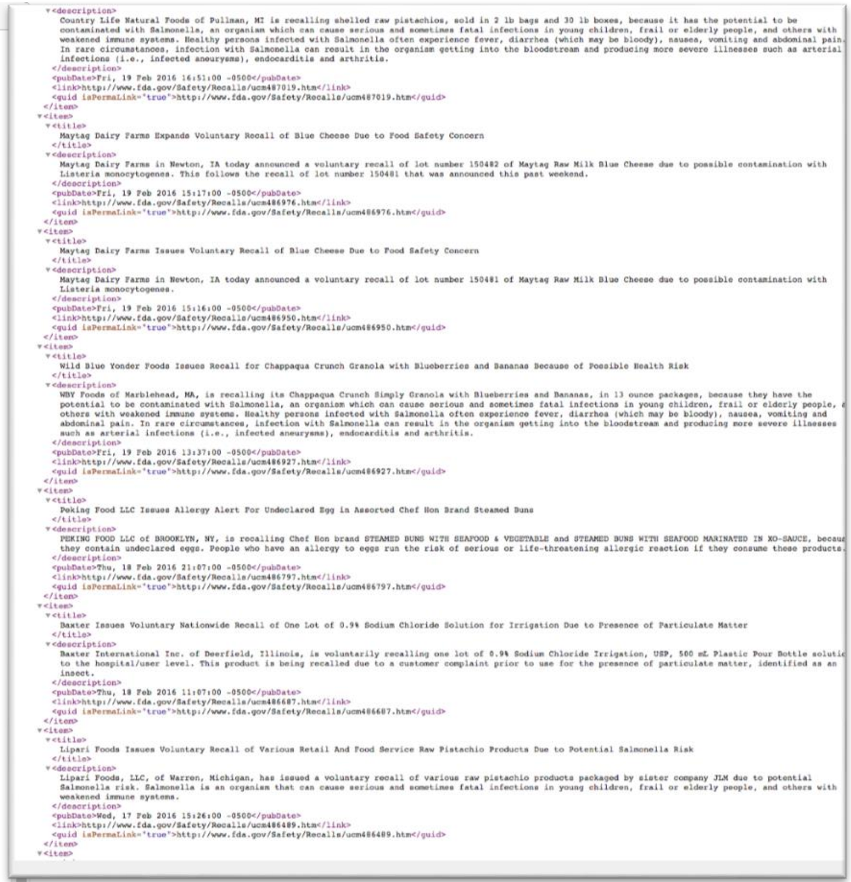

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       contaminated with Salmonella, an organism which can cause serious and sometimes fatal infections in young children, frail or elderly people, and others with
       weakened immune systems. Healthy persons infected with Salmonella often experience fever, diarrhea (which may be bloody), nausea, vomiting and abdominal pain.
       In rare circumstances, infection with Salmonella can result in the organism getting into the bloodstream and producing more severe illnesses such as arterial
       infections (i.e., infected aneurysms), endocarditis and arthritis.
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       Maytag Dairy Farms Expands Voluntary Recall of Blue Cheese Due to Food Safety Concern
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       Maytag Dairy Farms Issues Voluntary Recall of Blue Cheese Due to Food Safety Concern
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       Wild Blue Yonder Foods Issues Recall for Chappaqua Crunch Granola with Blueberries and Bananas Because of Possible Health Risk
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       WBY Foods of Marblehead, MA, is recalling its Chappaqua Crunch Simply Granola with Blueberries and Bananas, in 13 ounce packages, because they have the
       potential to be contaminated with Salmonella, an organism which can cause serious and sometimes fatal infections in young children, frail or elderly people, a
       others with weakened immune systems. Healthy persons infected with Salmonella often experience fever, diarrhea (which may be bloody), nausea, vomiting and
       abdominal pain. In rare circumstances, infection with Salmonella can result in the organism getting into the bloodstream and producing more severe illnesses
       such as arterial infections (i.e., infected aneurysms), endocarditis and arthritis.
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       Peking Food LLC Issues Allergy Alert For Undeclared Egg in Assorted Chef Hon Brand Steamed Buns
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       PEKING FOOD LLC of BROOKLYN, NY, is recalling Chef Hon brand STEAMED BUNS WITH SEAFOOD & VEGETABLE and STEAMED BUNS WITH SEAFOOD MARINATED IN XO-SAUCE, becau
       they contain undeclared eggs. People who have an allergy to eggs run the risk of serious or life-threatening allergic reaction if they consume these products.
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       Baxter Issues Voluntary Nationwide Recall of One Lot of 0.9% Sodium Chloride Solution for Irrigation Due to Presence of Particulate Matter
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       Baxter International Inc. of Deerfield, Illinois, is voluntarily recalling one lot of 0.9% Sodium Chloride Irrigation, USP, 500 mL Plastic Pour Bottle soluti
       to the hospital/user level. This product is being recalled due to a customer complaint prior to use for the presence of particulate matter, identified as an
       insect.
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       Lipari Foods Issues Voluntary Recall of Various Retail And Food Service Raw Pistachio Products Due to Potential Salmonella Risk
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       Lipari Foods, LLC, of Warren, Michigan, has issued a voluntary recall of various raw pistachio products packaged by sister company JLM due to potential
       Salmonella risk. Salmonella is an organism that can cause serious and sometimes fatal infections in young children, frail or elderly people, and others with
       weakened immune systems.
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Top: RSS Feed Raw Output

Left: ARMIS Graphic User Interface. The window is to provide visual confirmation that the program is working.