

Triple-i Researcher

What is Triple-i Researcher?

Triple-i Researcher is a web based application designed to mine the U.S. Food and Drug Administration's publicly available data on drug adverse events, medical device adverse events, and medication error reports.

Powered by jQuery, jQueryUI, charts.js, and Bootstrap 3, this single page HTML5 web application utilizes the openFDA data set as its model, and is designed as a tool to assist researchers in identifying anomalies (*spikes*) in aggregated data sets meeting the researchers' specified criteria. Furthermore, this tool enables researchers to delve into the details that comprise the identified anomalies.

Please note that openFDA is a beta research project and not for clinical use. While the FDA makes every effort to ensure that data and logic are accurate, you should assume all results are unvalidated.

The History of Triple-i Researcher

OpenFDA is a project created in March 2013 by Taha Kass-Hout, MD, MS, the FDA's first Chief Health Information Officer. OpenFDA's goal is to create easy access to public data, to create a new level of openness and accountability, to ensure the privacy and security of public FDA data, and ultimately to educate the public and save lives.

Triple-i Researcher is a functional prototype web app intended to mine the adverse events data set made accessible by the openFDA API (<https://open.fda.gov/drug/event/>). It was designed in response to the openFDA Developer challenge, announced May 11, 2015 (<https://open.fda.gov/update/an-open-challenge-to-tap-public-data/>). Using a mix of Agile and Extreme Programming (XP) methodologies, a small team of four developers started design work for this application on June 18, 2015, with the goal of leveraging existing web technologies to deliver solid results within a short time frame.

Functional prototype in this context means an HTML page and support files originally designed to run locally from the user's PC, but also available online at <http://iiiiresearch.net/>. This web application's user interface pulls and displays Adverse Events data made available through the openFDA API. The designers are aware of the need for their JavaScript to be refactored.

Currently, this app is not designed for mobile devices.

The Anatomy of the Triple-i Researcher

Triple-i Researcher is a single web page application written in HTML5 which connects to the `api.fda.gov/drug/event.json` end point. The web page is supported by a collection of CSS, fonts, and JavaScript files, which collectively leverage the following open source technologies: jQuery, jQueryUI, charts.js, and Bootstrap 3.

Functional Areas

Product/Adverse Events Search

Triple-i Researcher permits a researcher to search a date range for adverse events associated with a drug's generic name, substance name, or both. The search may be filtered against a specific category of reaction and spike threshold percent, with an option to limit results to spikes only.

Tier1 Data Visualization

The results of a researcher's initial search will be displayed in a scrollable bar graph, with event dates on the x-axis and numbers of events on the y-axis. Spikes will be represented in red. Hovering over any bar will yield a tooltip providing details (number of reactions, percent deviation from the average) for that day's events. Clicking on any bar will open a dialog to delve into details for that day's events, which will be presented as Tier2 data visualization.

Tier2 Data Visualization

Tier2 data visualization begins with a two-tabbed dialog, with tabs named *Chart* and *Raw Data*.

- *Raw Data* allows researchers to view the underlying data as a scrollable multi-page chart. This view provides the researcher with a few options described in the Tier2 Discrete Data Interaction section that follows.
- *Chart* allows the user to segregate results by category groupings to yield new visualizations for that day's adverse events.
Researchers may group that day's adverse events according to
 - reaction type
 - drug delivery method
 - drug role
 - patient sex
 - patient age
 - patient weight

Bar graphs will be generated to display the breakdown of events according to the selected category.

Tier2 Discrete Data Interaction

Researchers may search, sort, and export the raw, charted data displayed in the Tier2 *Raw Data* tab.

Triple-i Researcher Architecture

Triple-i Researcher has been constructed using the following grocery list:

- App core framework: HTML
- Database: openFDA API (`api.fda.gov/drug/event.json` end point)
- Javascript Libraries: jQuery, jQueryUI, Bootstrap3, chars.js, Datatables, Bootstrap-datepicker, misc dependencies
- CSS Library: Bootstrap 3