

# **ANALYTICAL REVIEW OF FLORIDA DEPARTMENT OF HEALTH (FDOH) REPORT BASED ON INFORMATICS STACK LEVELS**

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## **Stack Analysis Report**

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**Abstract:**

This Davies Report concerns the organization, Florida Department of Health (FDOH), who implemented the Electronic Surveillance System for the Early Notification of Community-based Epidemics, Florida (ESSENCE-FL). This organization functions in the "world" of public health, with the specific imperative of difficulty with a variety of health data and variations in epidemiology staff skills, and goal of early event detection to a multifaceted surveillance system. This report focuses on the role of state epidemiologist, whose primary goal is meeting a diverse set of public health challenges. I focus on the primary functions of the early event detection to a multifaceted surveillance system supporting routine descriptive epidemiologic analysis, data visualization, and reporting across many data sources, using and building on tools originally developed for syndromic surveillance, and describe its success. I describe its Workflow and provide an example of the user's interaction with the system, including the cognitive processes involved (multilevel framework theory). I describe the information system put into place, and how it works to support that Workflow and the Functions. I also describe the modules comprising the system (ESSENCE-FL), and how they, themselves, are "systems" in their own right. I describe the data, information, knowledge employed by the modules and the system to support those functions. Finally, I describe the technology underlying the information system.

I consider the standards in the system from each level of the Stack, in the context of interoperability. I also describe the privacy, confidentiality, and security concerns addressed and any ethical issues either explicit or implicit in their report.

I close with an assessment of the completeness of this report itself, an assessment of the Stack for describing the project, and with my thoughts on what I gained from the exercise.

## **World:**

Obviously, the FDOH project lives in the world of public health which is known of its difficulty with a variety of health data and variations in epidemiology staff skills in county health departments and the need to integrate new data in a flexible and adaptive way. In addition to the system goals, there is the role of state-wide surveillance epidemiologist which is established by the Bureau of Epidemiology and the Johns Hopkins University (JHU) Applied Physics Laboratory. This role represented in day-to-day oversight of the system, ensuring project goals are met, overseeing technical components including data transmission, processing, and data quality controls and facilitating communication and coordination among data providers (hospitals, Vital Statistics, Poison Centers etc.) and users. Also, the surveillance epidemiologist communicates FDOH's business needs directly to JHU staff and completes final user acceptance testing.

All the above-mentioned goals and role design are clearly structured based on the public health world impact which need collaborative efforts to promote health and safety (improving the quality of live) in all populations through ensuring high quality public health services and health care values.

## **Organization:**

The organization that was applied to Davies Award in this report is Florida Department of Health, a public health organization, which has the mission of promoting and protecting the health and safety of all people in Florida through the delivery of quality public health services and promotion of health care standards. FDOH's goal of implementing ESSENCE-FL is maximizing the ability of meeting a diverse set of public health challenges. Detailed goals involve improving internal public health efficiencies, decision-making related to disease control efforts and communication, and reducing the need for specialized and costly trainings in various data management, statistical and mapping software packages, and finally providing an intuitive environment for epidemiologists to

conduct analyses for outbreak detection, routine descriptive epidemiologic analysis, and monitor morbidity and mortality trends over time, geography, and across multiple data sources. A new policy was set by BOE and the Bureau of Environmental Public Health Medicine which is providing training and assistance by the statewide surveillance epidemiologist through web-based recorded trainings, interactive WebX trainings and site-visits at hospitals or CHDs for one-on-one or classroom-based training. This is helpful for managing varied skills and overcoming difficulties.

Regarding the evidence that FDOH demonstrated to ensure that the solution addressed/solved their organization-level goal, they first explored, by BOE, the feasibility of the system by the results of a research project carried out by JHU, and they mentioned the system implementation process with new considerations and state and finally they stated the current usage of ESSENCE-FL system with four different data sources.

Similarly to the public health world nature with a diverse of goals and standards, FDOH is characterized by a diversity in the population (location of Florida) with continuous increasing in population which has increased the need to incorporate such a single system that could be used to work with many different types of health data.

### **Role:**

The role here is the role of state epidemiologist (state-wide surveillance epidemiologist) which is a primary role for the ESSENCE-FL system since with a goal of meeting a diverse set of public health challenges.

### **Functions:**

The primary function of ESSENCE-FL system is the early event detection to a multifaceted surveillance system supporting routine descriptive epidemiologic analysis, data visualization, and

reporting across many data sources, using and building on tools originally developed for syndromic surveillance. The goal of this function is facilitating communication and coordination among data providers and users about current observations and about system design, functionality and reporting tools. The evidence which is provided to achieving the goal is mentioning that the system successfully achieved the objective especially the success of data management which has led by a surveillance epidemiologist who is very familiar with the end user business needs, who is directly involved in communications with data source IT contacts, and is familiar with the more technical interactions with on-boarding new data sources.

In case that the system does not accomplish its goal, PRISM framework of evaluation will be used to re-assess determinants in organization, technology and behaviour and use this input of assessment and strategies to develop health system performance and outcomes. PRISM is best used in this case because it includes many variables in form of Xs and Ys that allow better understanding for the reassessment process.

### **Workflow:**

The FDOH described the workflow in their report in written sentences without using drawings (diagrams or flowcharts). The below figure shows the user interface of ESSENCE-FL system and how the process is done (figure 1), which is best demonstrating multilevel framework theory of information behaviour for care coordination work. This is obvious from the levels of getting data from different sources with specific level of knowledge and ability of the staff (physicians and nurses) and moving to different level of incorporating and classifying data with also certain level of knowledge (data entry staff), until reaching informaticians and epidemiologist level with data exploring functions and varied usage of the system.

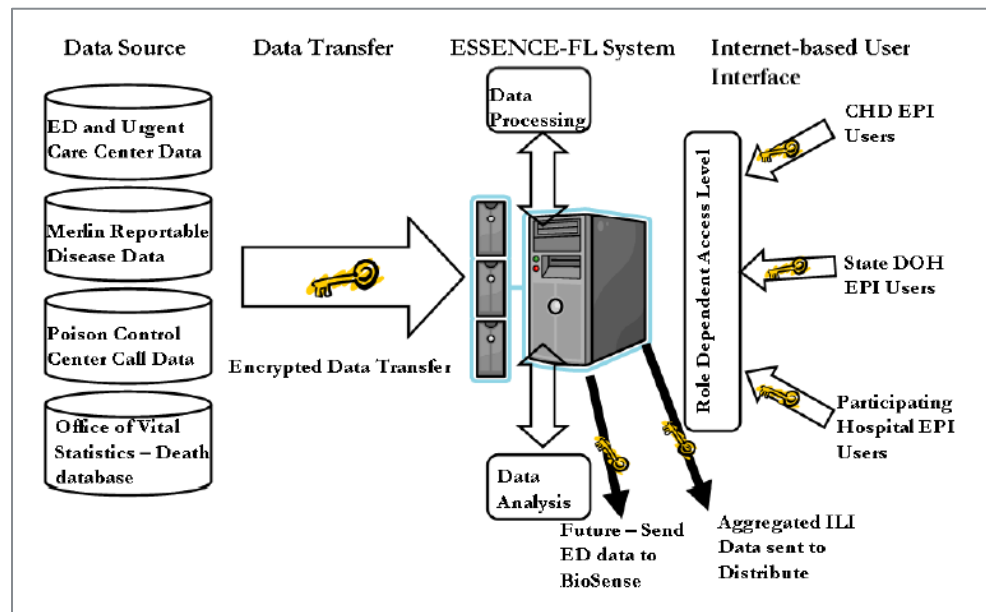


Figure 1: ESSENCE-FL system usage process.

### Information System:

The system in this project named Electronic Surveillance System for the Early Notification of Community-based Epidemics, Florida (ESSENCE-FL). The primary need that was listed in the report by the state's emergency preparedness leadership for introducing the system was desiring a single system that could be used to work with many different types of health data. Additional needs are early event detection (based on emergency department [ED] chief complaints) to a multifaceted surveillance system supporting routine descriptive epidemiologic analysis, data visualization, and reporting across many data sources, using and building on tools originally developed for syndromic surveillance. The system required to be flexible to integrate new data streams such as environmental data sources and vital statistics, and to be able to quickly adapt and update definitions of syndromes and other conditions under surveillance. These requirements led to obtain the following specifications in sequential order:

1. Free text chief complaints from hospital ED records are analysed into syndromes and sub-syndromes by a version of a natural language processing developed by JHU.
2. Natural language processing: correct for common misspellings and medical shorthand.

3. The data are processed through the detection database.
4. Results are transferred to the web database: where the users can access the data visualizations and alert lists.
5. Ad hoc queries from users can be completed and the detection algorithms will run dynamically on these user specified queries and time series graphs (a unique feature).
6. Finally, presentations of statistical results: static alert list table views and dynamically generated for any data source.

This information system is clearly set based on population centred architecture (in public health world) which includes the following software development process: sourcing data, transferring data, processing and analysing data and finally internet-based user interface function level. This system design and architecture were influenced by some public health programs including the Florida Department of Health (FDOH), Division of Disease Control, Bureau of Epidemiology (BOE), Acute Disease Epidemiology Section (ADES) manages the ESSENCE-FL system.

### **Module:**

There are four different data sources represent four modules in ESSENCE-FL but the reportable disease module seems to be more relevant to the function of the system which it also can be considered an information system on its own. The reportable disease module can be used as a detector of situational awareness and monitoring trends only by utilizing data visualization schemes and data dashboards for monitoring large sets of data and describing current trends in classifying way.

### **DIKW:**

The primary data in this system is free text chief complaints from hospital ED records which are unstructured data. The most important pieces of information are presentations of statistical results



which inform users in explicit way about current trends in the reportable disease data.

### **Technology:**

The technologies support this project are ED EHR, data ingestion database, detection database, web database, detection algorithms, and web application. The primary technology which is ED HER comes in the bottom of Trough of Disillusionment on the Hype Cycle.

In this project, there is technical system integration and interoperability with other information systems is on-going by data exchange by FDOH outside of the state.

### **Policies:**

No national standards mentioned but ED syndromic surveillance standards have varied widely between systems. Some standards were included as follows: the International Society for Disease Surveillance (ISDS), in close collaboration with the Centers for Disease Control and Prevention (CDC), developed syndromic surveillance standards and guidelines to clarify the public health syndromic surveillance requirements to meet Meaningful Use. FDOH actively participated with ISDS in the development of these standards. Design work has begun in order to receive HL7 messages for ESSENCE-FL ED data to ensure the system is compliant with the final Meaningful Use rule.

### **Privacy, Confidentiality, Security:**

The privacy in this system is secured in certain steps of ESSENCE-FL implementation as demonstrated in figure 1. In addition, all four modules received data is de-identified with having unique record-level identifiers which are produced by the data sender. Another safety steps are included to ensure confidentiality and security which are:

- Secure transfer methods (sftp, VPN, public/private keys).



- Web server using SSL encryption.
- Role based user access levels (assigned at the time of account creation) by user ID and password.
- Secure (https) web-based application.

**Ethical concerns:**

The ethical concerns for this project appear to be on two divisions: patient based and user based. The patient-based concerns involve privacy, confidentiality and security issues which are ensured by the state's emergency preparedness leadership. The user-based concerns are ensured by dissemination rights and training that are mentioned in the report.

**Reflection:**

In general, this report was comprehensive with information clear and complete regardless the absence of some policies clarification. On stack levelling, workflow was reported less detailed, and information systems also needed some details. However, organization level was explained perfectly.

This was a great opportunity to practice how to stack analysing health reports in very understandable manner.