

Refactoring INDICATOR into an Advanced Information System for One Health Monitoring

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Objective

To redesign INDICATOR for One Health, establish a common data format, and provide for long term scalability.

Introduction

INDICATOR is a multi-stream open source platform for bio-surveillance and outbreak detection, currently focused on Champaign County in Illinois[1]. It has been in production since 2008 and is currently receiving data from emergency departments, patient advisory nurse call center, outpatient convenient care clinic, school absenteeism, animal control, and weather sources. Long term scalability was however compromised during the 2009 H1N1 influenza pandemic as immediate public health needs took priority over our systematic development plan. With the impending addition of veterinary clinic data and recognizing that the health of a community also depends on animal and environmental factors, we decided to revisit the INDICATOR architecture and redesign it to be a more holistic and scalable system. We also decided to revisit the data submission format, keeping in line with the philosophy of making opportunistic secondary use of as much data about the health of a community that we can obtain.

Methods

Following a formal evaluation of the existing production version of INDICATOR we established the systems architecture shown in Figure 1 to leverage work in other cyberinfrastructure projects at NCSA.

Results

We have now implemented the back end changes, including unifying the multiple physical MySQL database systems and multiple Apache Tomcat application engines into a single system. A web application, using service oriented principles and the GWT library, has been developed that can query and display the newly unified data and provide new options for input of data to the system.

In order to streamline and simplify the data format we decided to define a single format that can be used by different kinds of health-care providers, both human and veterinary. Although we recognize the limitations in this approach we define a reported event to be a simple what, when, and where containing the following seven fields or the relevant subset based roughly on the ISDS meaningful use recommendations [2]

1. Date of incident
2. ICD-9 code for the primary diagnosis
3. Free text of the diagnosis (not the text definition of the ICD-9 code)
4. Text chief complaint at triage
5. Location
6. Count
7. Species

In this way we can handle, in a single format, data from emergency departments, convenient care clinics, patient advisory nurse call centers, veterinary clinics, veterinary labs, and veterinary poison control centers.

Conclusions

INDICATOR has been significantly redesigned and is now more integrated, scalable, and secure. It is now placed to become a One Health integrated monitoring system.

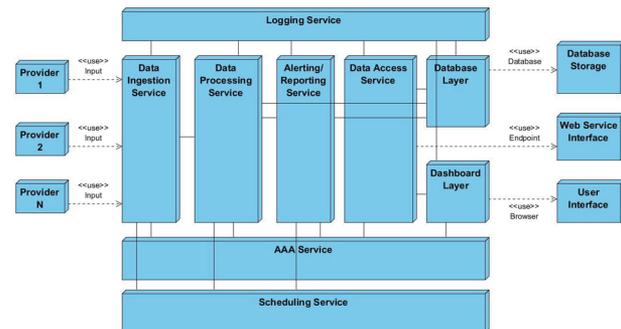


Figure 1. INDICATOR system architecture

Keywords

Open Source; Surveillance; Informatics; One Health

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References

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