End-to-End Disease Surveillance Solutions
OpenESSENCE
Part of the ESSENCE Suite Tools
Electronic Surveillance System for the Early Notification of Community-based Epidemics
OpenESSENCE
Integration with Disease Surveillance Data

Stakeholders Using Various Collection Techniques

Independent of Intermediate Transmission Medium

Data Collection Servers

ETL, Detection, Database, and Web Application Servers

Analysts, Administrators, and Users

- Health Care Worker
- Health Care Official
- System Administrator

Configurable Extract, Transform, and Load Processes (ETL)
OpenESSENCE functionality is derived from APL’s Enterprise ESSENCE which is currently operational in both the United States and Overseas for the U.S. DoD and U.S. civilian health departments.

• Addresses the need for analysis tools that are
  – Open source
  – Internationalized
  – Self administrating
  – Extensible
  – Low cost

• Initially focused on the the requirements of the U.S. Naval Medical Research Center Detachment (NMRCDD) in Lima, Peru

• Installing and testing in Peru in Aug/Sep 09
  – integrating data collected with the Elastix IVR call tree designed and developed by NMRCDD
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Design and Extensibility

• **Design**
  – Incorporates APL and NMRC’s experience in Biosurveillance and IT systems
  – Deployable using only open source software components
  – To be released as open source after initial version is completed
  – Security, encryption, and internationalization support build into core system
  – Industry standard technologies (e.g. Java EE, Apache Tomcat, Spring, MySQL)

• **Extensibility**
  – Dynamic, flexible design
    • *Deploys with requiring programming and development*
    • *Configuration and data definition drive functionality and interface*
    • *Database independence*
  – Plug-in API for detection algorithms
    • *Open source and proprietary algorithms*
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Features of Initial Release

- Configurable database and data sources
- Extract, transform, and load (ETL) synchronization loads surveillance data from any JDBC compatible database
- Language internationalization of all user interface components
- Time series visualization with anomaly detection and image export
- Drill down to data details view (individual records)
- Data details can be exported to Excel/CSV for analysis in other tools
- Future development driven by feedback from sponsor and users
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Demonstration

DEMONSTRATION
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Design Goals Achieved So Far

• Modular, component based application design
  – *Improved separation of concerns and testability*
  – *Repurposing and reuse is easier and more likely*

• Data driven system structure
  – *Allows for dynamic extension and reconfiguration*
  – *Eliminates need to redevelop or rebuild application to incorporate adjustments or enhancements*

• Open source technology stack
  – *Various libraries and server applications are stable*
  – *Software deployment costs are based on days of configuration instead of months of development*
Multi-national, multi-lingual teams can be quite effective despite additional obstacles they face
  – Communication requires special emphasis and clarity
  – A common language is needed between some members of each team

Open source tools provide unique value but require an ongoing intellectual investment to maximize their return
  – Performance and security gains in Apache Tomcat eliminated the need for Apache HTTP server
  – Projects with developer/user communities can change and grow quickly
    • Keeping up to date is time consuming but necessary

It is hard to scope and scale development for unknown data sets

Iterative design and development reduces rework
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Future Directions

• Integrate web based data entry
• Administrative support
  – User administration
  – Saved queries and query linking
  – System configuration and customization
• Enhance analysis and visualizations with pie and bar charts
• Geographic Information System (GIS) mapping integration
• Non-database sources of data: text, csv, and Excel
• Installation in additional countries
• Batch detection processing and Alert List integration
• Support H1N1 efforts
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