

Johns Hopkins University Applied Physics Laboratory

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U.S. Department of Defense

Global Emerging Infections Surveillance and Response System

David Blazes

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End-to-End Disease Surveillance Solutions

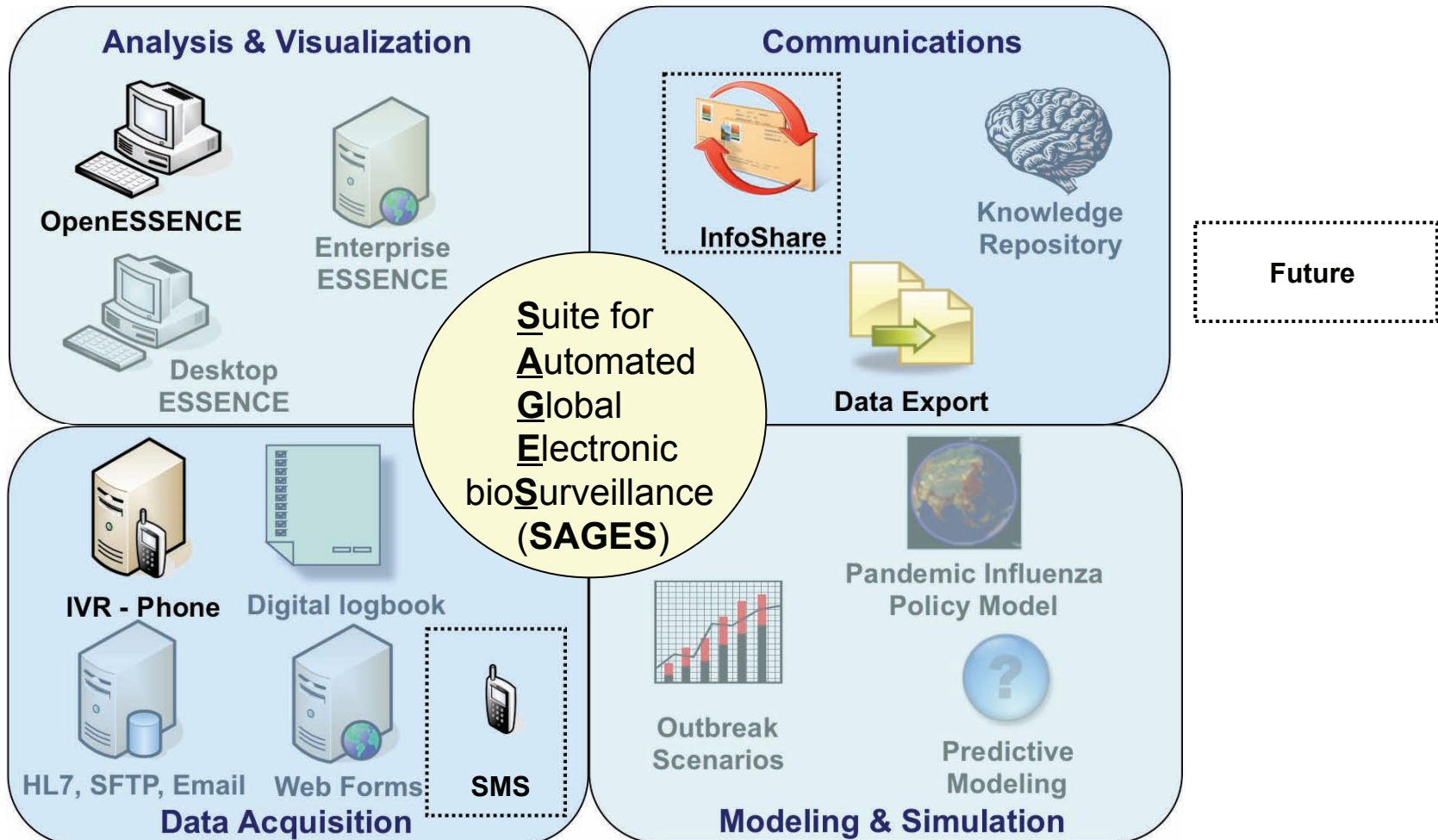
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APPLIED PHYSICS LABORATORY

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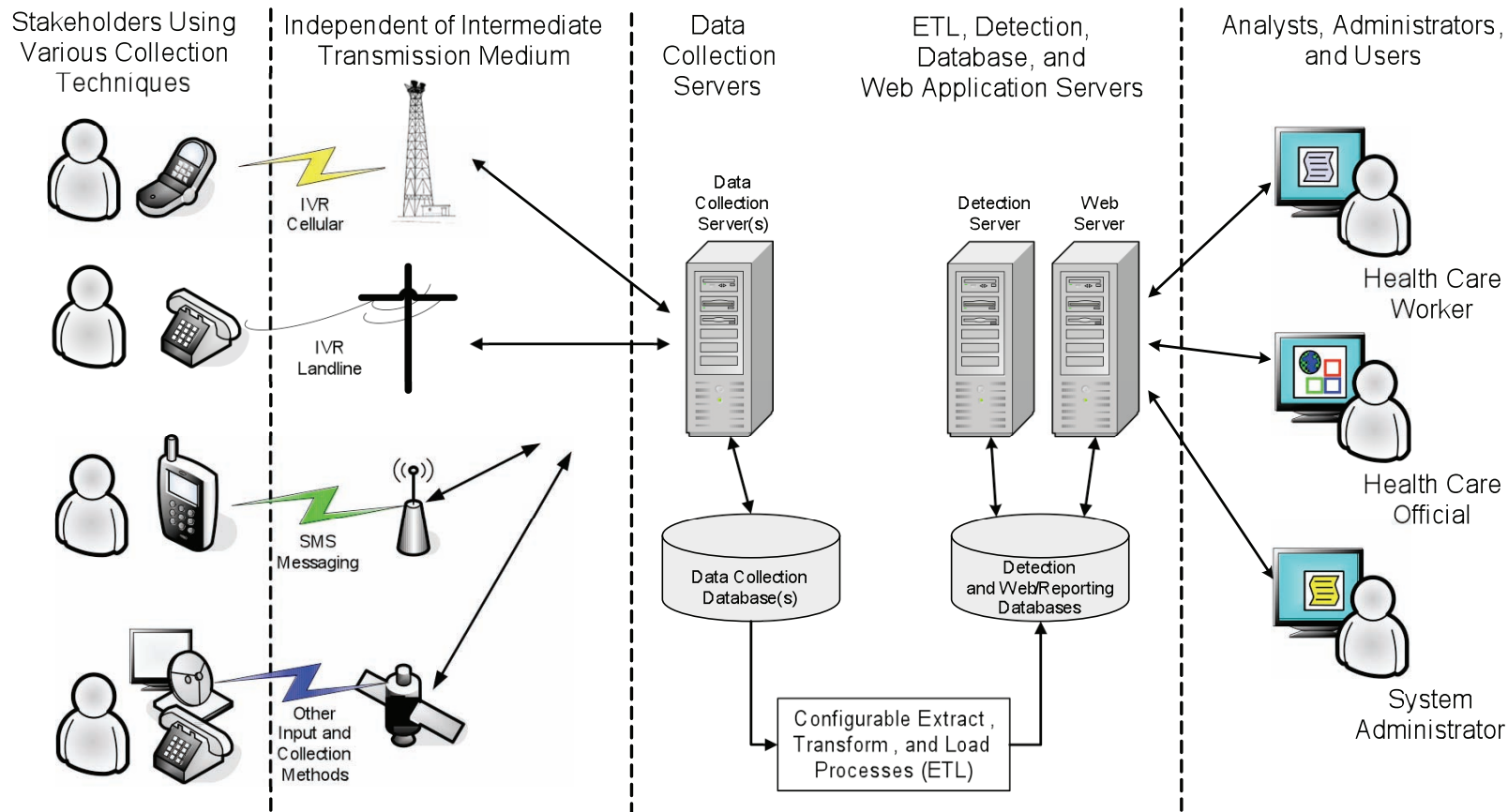
Part of the ESSENCE Suite Tools

Electronic Surveillance System for the Early Notification of Community-based Epidemics



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Integration with Disease Surveillance Data



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Overview

- **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*



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Lessons Learned

- 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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