

Experiences Deploying a Secure, Multi-enterprise Distributed Medical Records System for Medical Surveillance

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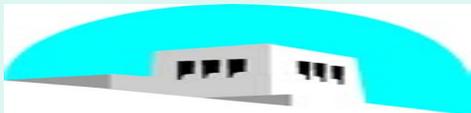
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April 8, 2003



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Outline

- Why are we doing this?
- What is it?
- How does it work?
- What has worked well and what hasn't?
- Where are we going?



BDI: Integrated capability to detect, mitigate and respond to biological-related incidents

- **Early detection and characterization of biological-related incidents**
 - Application to urban areas, other high-value assets, and special events
 - Reduce casualties
 - Minimize disruption to infrastructures
 - Support other consequence management efforts
- **Assist the Metropolitan Medical Response System**
 - To identify populations at risk
 - To support their treatment of the symptomatic population
 - To protect the environment
- **Support the Departments of Justice and Health & Human Services as they work with state and local governments**



Biological Defense requires a full spectrum of technologies



A layered defense is essential for effective protection against biological terrorism



Near-term capability is achievable by integrating existing systems



Portal Shield Point Detector



Symptomatic Reporting



Point Detection



Hazardous Material Identification



Medical Diagnostics

B-SAFER System

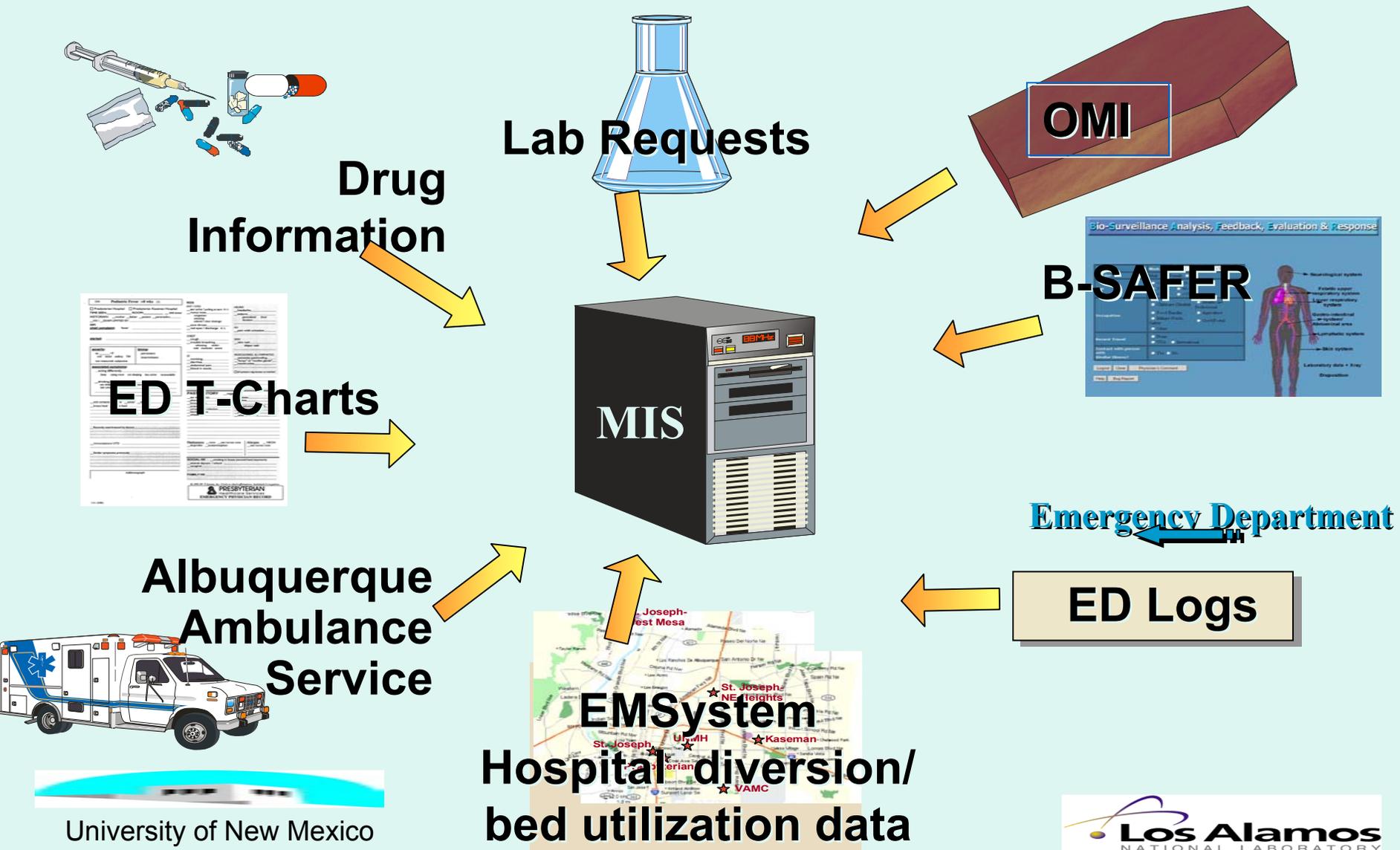
(Bio-Surveillance Analysis Feedback Evaluation and Response)

System Requirements

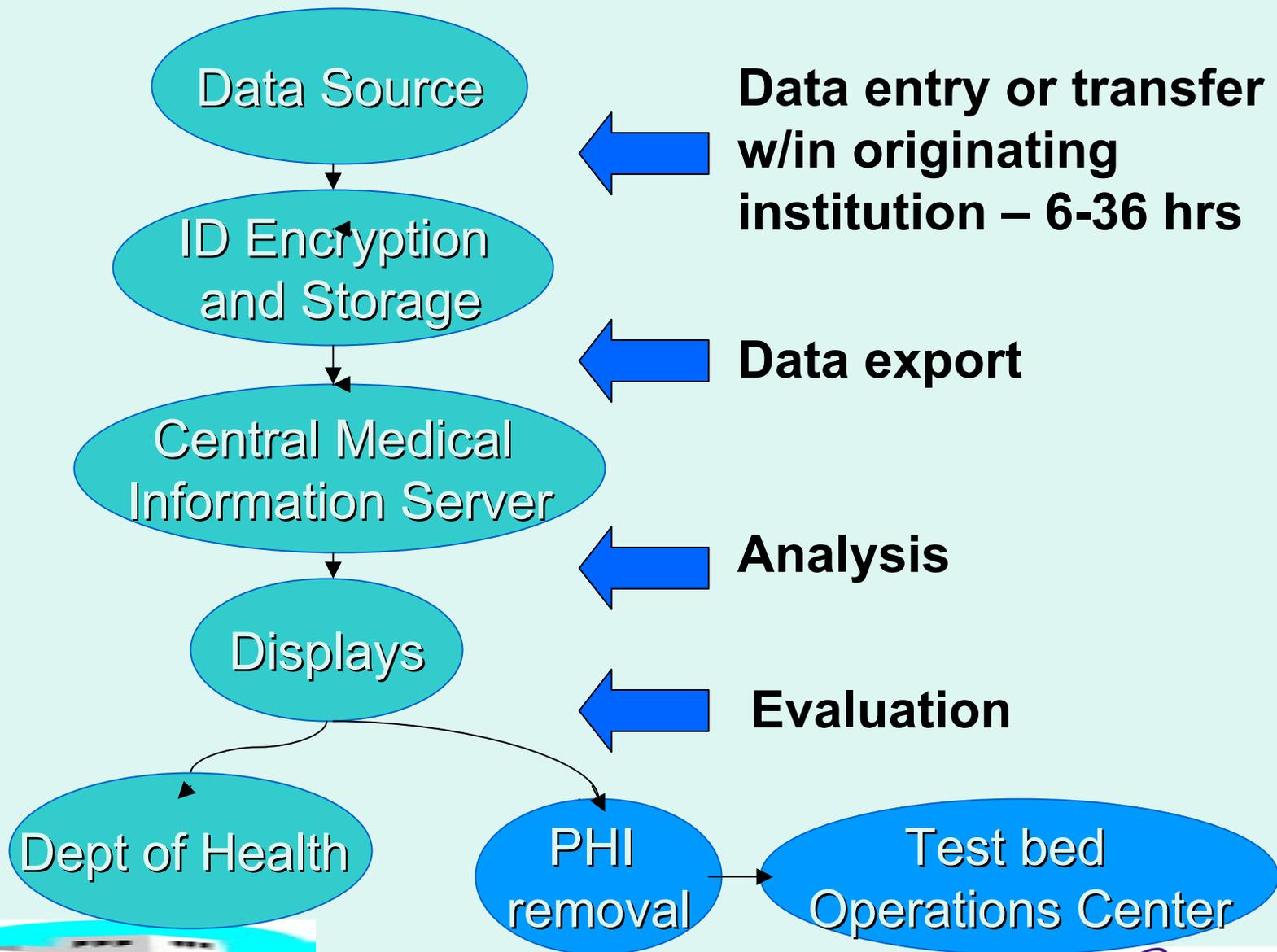
- ✓ Monitor & Analyze Information from
 - ✓ 7 of 8 Albuquerque Emergency Departments
 - ✓ Clinical laboratories
 - ✓ & Non-Traditional Sources, e.g. Drug Information Calls, Ambulance Services
- ✓ Data is stored/analyzed as de-identified patient data at a central server
 - ✓ System is HIPAA (Personal Privacy) Compliant
 - ✓ CDC-NEDSS Compliant
- ✓ Recognizes anomalies, either naturally occurring or caused by human intervention
- ✓ Is now incorporating projection capability to project potential outcomes of an outbreak and the potential benefit of intervention techniques



B-SAFER Data Inputs Into The Medical Information Server



Data Flow



Hospital Locations for Albuquerque Testbed

★ Sandia HC-
West Mesa

★ Sandia HC-
NE Heights

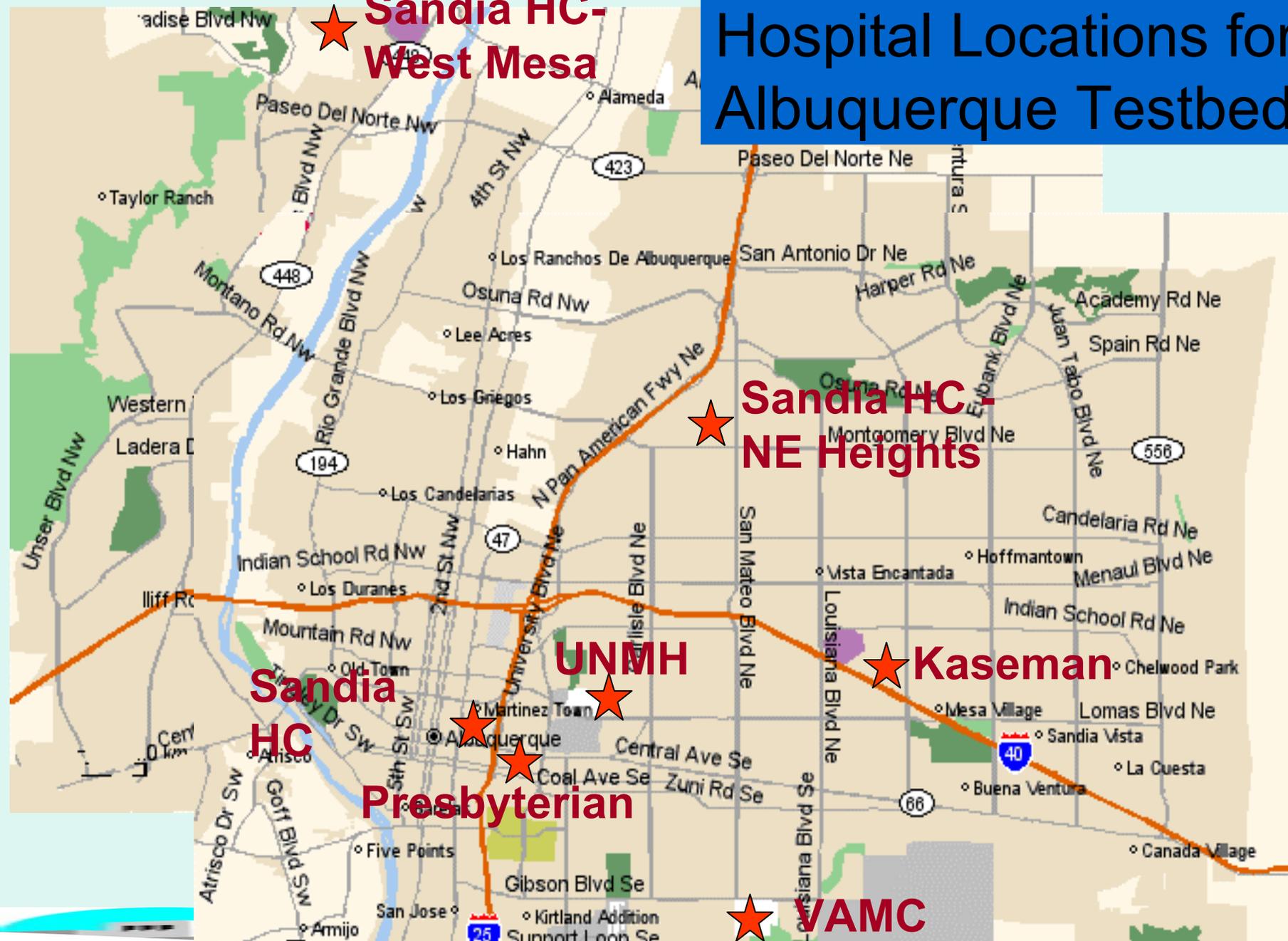
★ Sandia
HC

★ UNMH

★ Kaseman

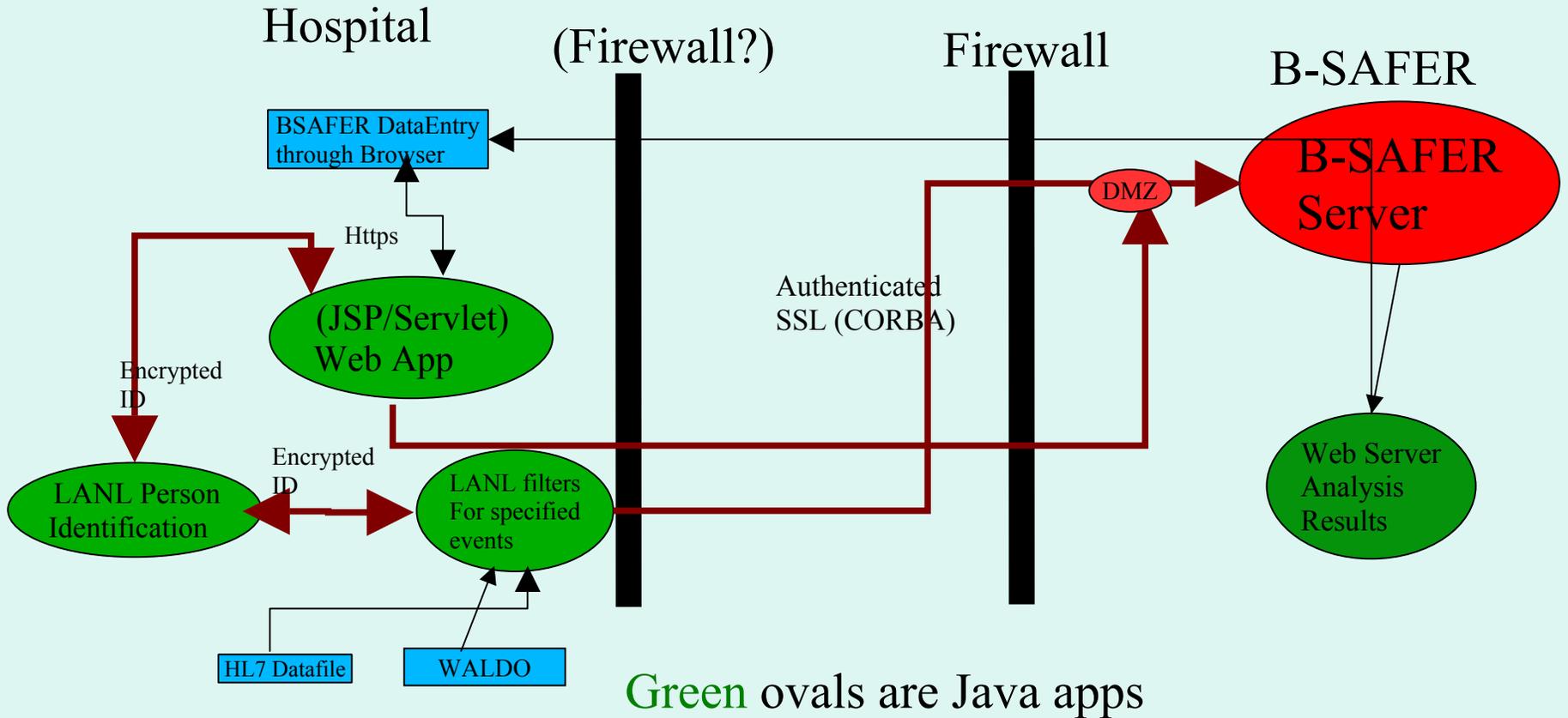
★ Presbyterian

★ VAMC



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B-SAFER System Diagram



How does it work?

- Security is the number one issue!
- Central server for the City of ABQ behind firewall
- CORBA clients at each data source site behind each facility's firewall
- Use OMG standard components for a distributed medical record
 - Data translation occurs at each facility to OMG's COAS specification
 - Person Identifiers stored at each site with encrypted identifier sent to central server



How does it work?

- Can't use usual VPN because each enterprise has something different and different firewall rules
- Use SSL encryption over the Internet with supplied certificates using negotiated outbound ports in each firewall.
- Use Xtradyne's Domain Boundary Controller (DBC) to handle CORBA firewall penetration



The Good

- Heterogeneous data models are well-handled by COAS
 - Each hospital is a little different
 - We use translate from XML, SQL, CSV, HL7, ...
- CORBA works well in this loosely-coupled environment
 - We didn't use Web Services because
 - Not supported at any facility
 - No functional standards as there is for CORBA
 - Security wasn't as mature
 - Mature CORBA solution already exists.
- All code available as open source at <http://OpenEMed.org>



The Good

- Component model has advantages over simple ad-hoc socket communication used in other surveillance systems
 - Well-defined medical context for information transmitted
 - Flexible deployment at each institution
 - Enables dynamic de-duplication of data to avoid false counting
 - Easy to link to original medical record at each facility for follow up
 - Easier to achieve HIPAA and IRB approval
- Heterogeneous platform deployment was easy



The Difficult

- Management difficult because of systems behind firewalls and heterogeneous VPN connectivity
- Wasn't able to use CSlv2 through the firewalls due to limitations of commercial products so we couldn't identify individual users sending data from their credentials
- Hope to have CSlv2 working shortly.



The Future

- Continue to collect data and analyze with the help of a NM state epidemiologist
- Transition to a testbed for a variety of surveillance systems
- Evaluate more completely the sensitivity, selectivity and accuracy of medical surveillance systems within a common framework.

